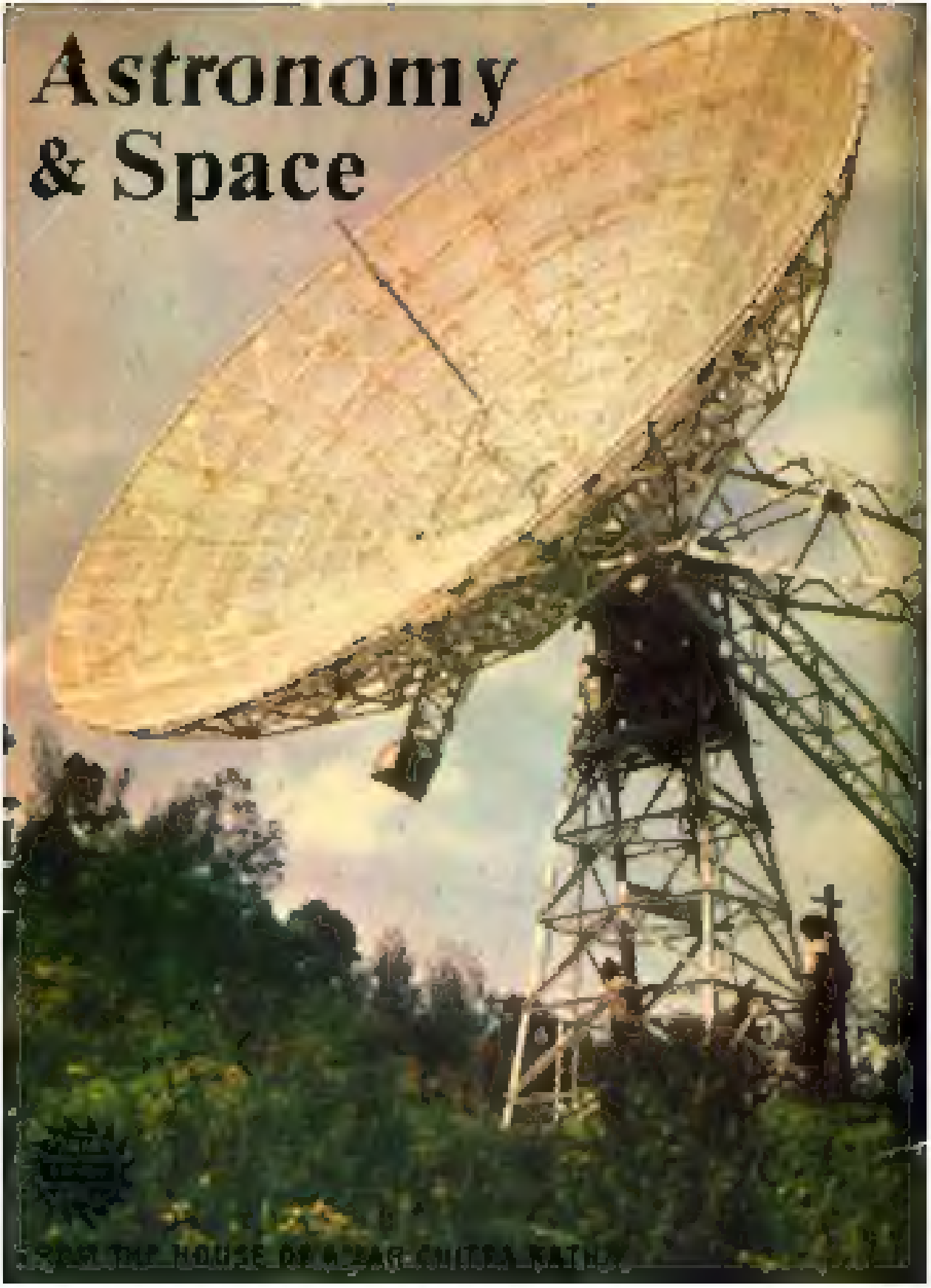
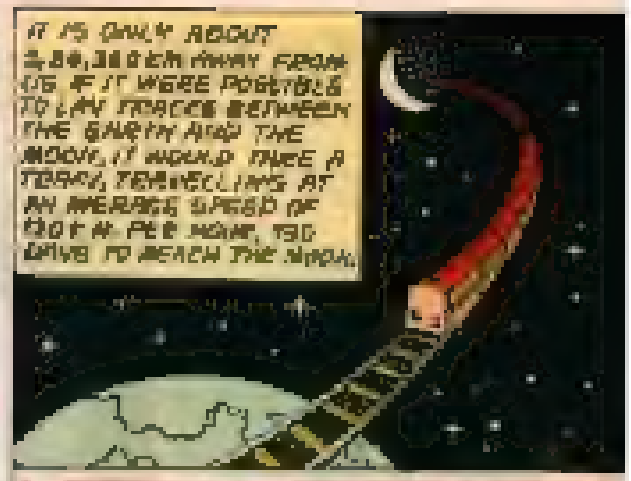
Astronomy & Space

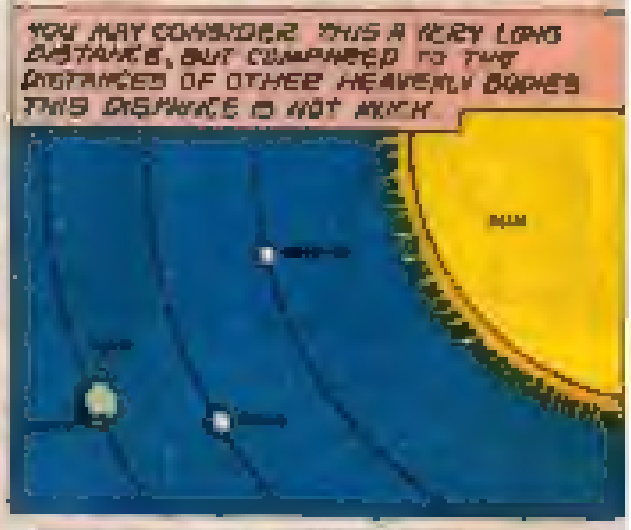


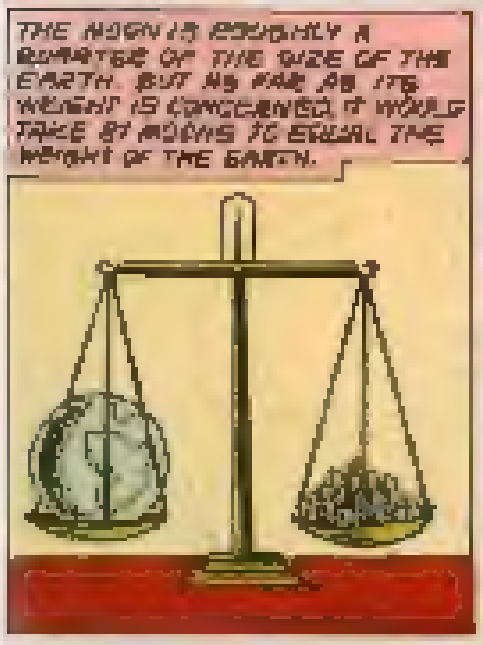
THE MOON —Our Strange Neighbour —1

Script: J.D. Iribe ■ Illustrations: Arpana Mandia

THE MOON IS OUR NEAREST NEIGHBOUR AND THE ONLY ONE EVER TO HAVE BEEN VISITED BY MAN.


IT IS ONLY ABOUT 238,000 KM AWAY FROM US. IF IT WERE POSSIBLE TO LAY TRACKS BETWEEN THE EARTH AND THE MOON, IT WOULD TAKE A TRAIN, TRAVELLING AT AN AVERAGE SPEED OF 60 KM PER HOUR, 150 DAYS TO REACH THE MOON.


YOU MAY CONSIDER THIS A VERY LONG DISTANCE, BUT COMPARED TO THE DISTANCES OF OTHER HEAVENLY BODIES THIS DISTANCE IS NOT MUCH.
SUN

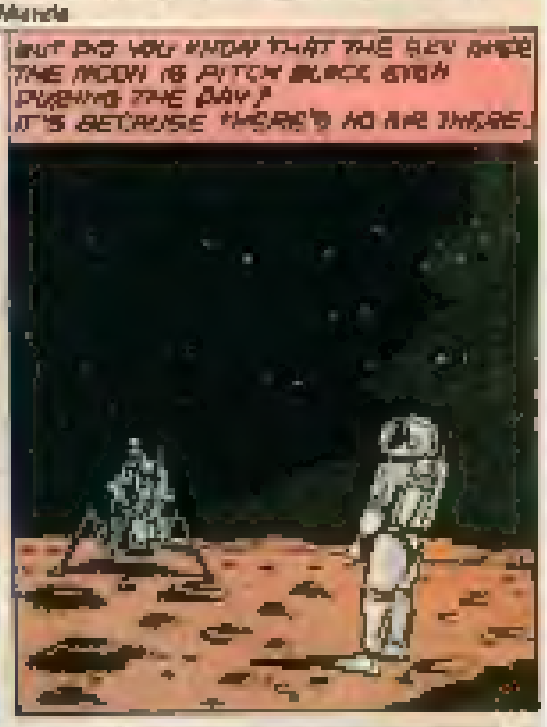

THE MOON IS ROUGHLY A QUARTER OF THE SIZE OF THE EARTH. BUT AS FAR AS ITS WEIGHT IS CONCERNED, IT WOULD TAKE 81 MOONS TO EQUAL THE WEIGHT OF THE EARTH.

ALL OBJECTS THAT ARE DROPPED FROM A HIGH POINT OR THROWN UP WILL COME BACK TO EARTH ULTIMATELY. THE EARTH 'PULLS' THEM ALL. THIS PULL OF THE EARTH IS CALLED GRAVITY.

THE WEIGHT OF EVERYTHING DEPENDS ON GRAVITY. THIS MAN CANNOT LIFT THIS BAR-BELL, WEIGHING 180 KGS.
BUT HE WOULD BE ABLE TO LIFT IT EASILY ON THE MOON BECAUSE THERE IT WOULD WEIGH ONLY 30 KGS. THE MOON'S GRAVITY OR PULLING POWER IS ONLY 1/6 OF THAT OF THE EARTH.
YOU CAN'T JUMP TOO HIGH ON THE EARTH, BECAUSE THE EARTH PULLS YOU DOWN VERY STRONGLY. IF YOU CAN JUMP 4 FEET HIGH HERE...
...ON THE MOON, YOU WOULD BE ABLE TO JUMP 24 FEET (6 M), BECAUSE EVEN THOUGH YOU WOULD BE SIX TIMES LIGHTER THERE, YOUR ENERGY WOULD REMAIN THE SAME.
IT IS DIFFICULT TO FALL ON THE MOON. THE ASTRONAUTS FOUND THAT IF THEY LOST THEIR BALANCE THEY BEGAN TO FALL IN SLOW MOTION, GIVING THEM PLENTY OF TIME TO REGAIN THEIR BALANCE.

THE MOON – Our Strange Neighbour – 2

Script : J.B. Ishar Illustrations : Anand Manda



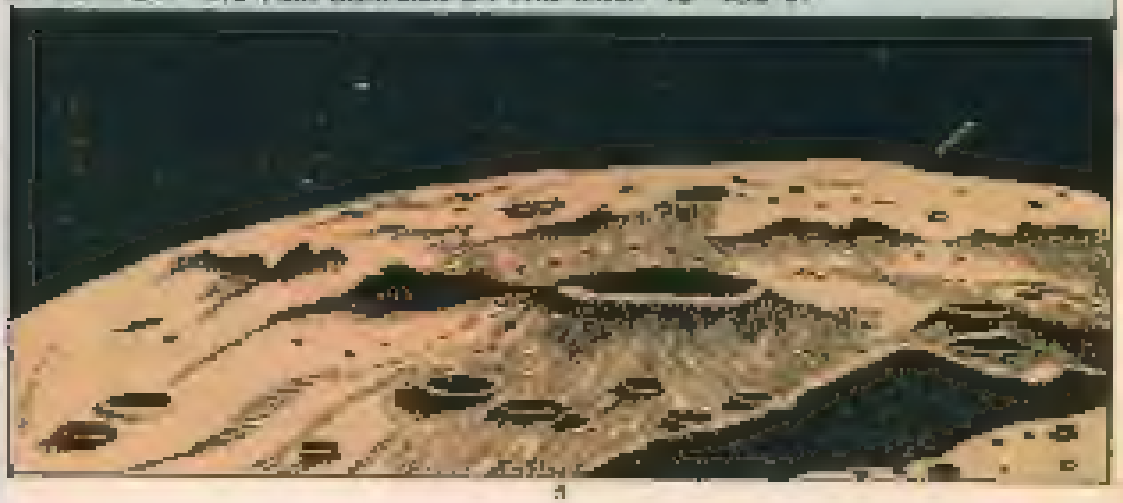
OUR EARTH HAS A BLANKET OF AIR AROUND IT. THIS BLANKET OF AIR IS CALLED THE ATMOSPHERE.
THE ATMOSPHERE MAKES OUR SKY LOOK BLUE AND IT DOES MANY OTHER THINGS BESIDES.
IN THE DAYTIME IT SHIELDS THE EARTH FROM THE SUN'S HEAT AND AT NIGHT IT PREVENTS HEAT FROM THE EARTH FROM ESCAPING INTO SPACE.

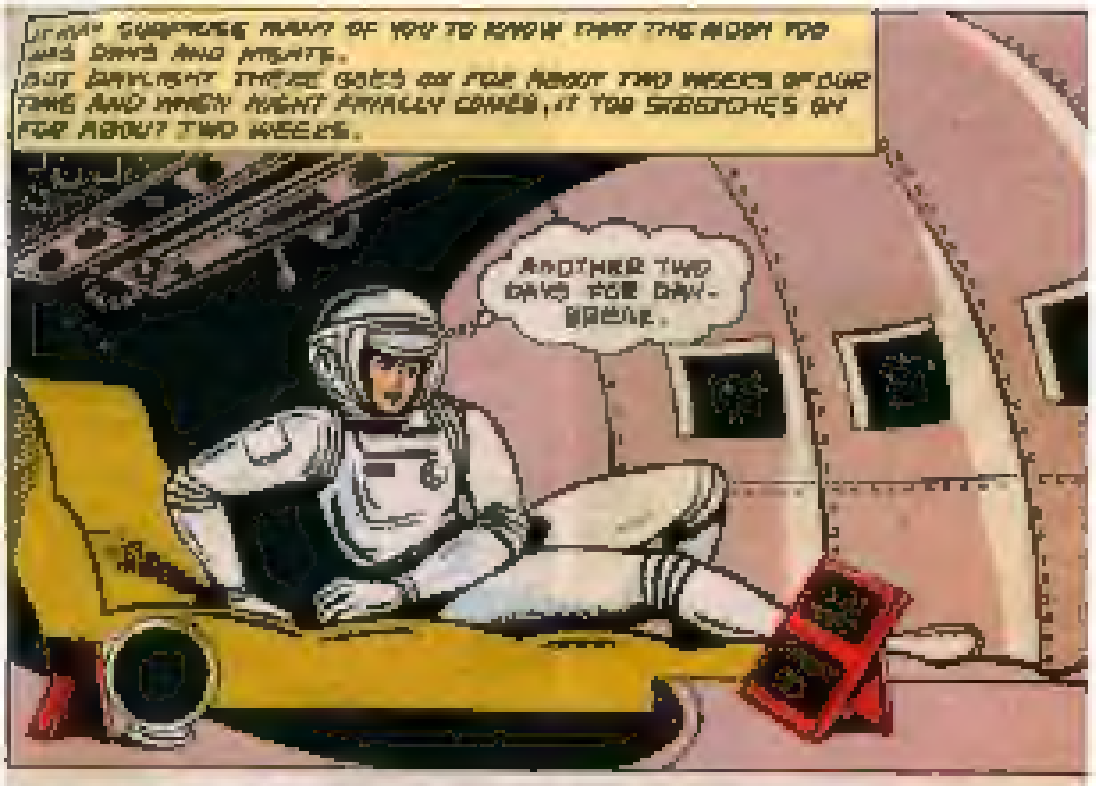
THE POOR MOON HAS NO ATMOSPHERE TO PROTECT IT.
DURING THE DAY THE SUN BEATS DOWN MERCILESSLY AND DIRECTLY ON THE MOON'S SURFACE AND THE TEMPERATURE GOES UPON THE BOILING POINT. IF A MAN WERE SUDDENLY TO FIND HIMSELF ON THE MOON, HIS BLOOD WOULD BOIL AT THE HEAT...

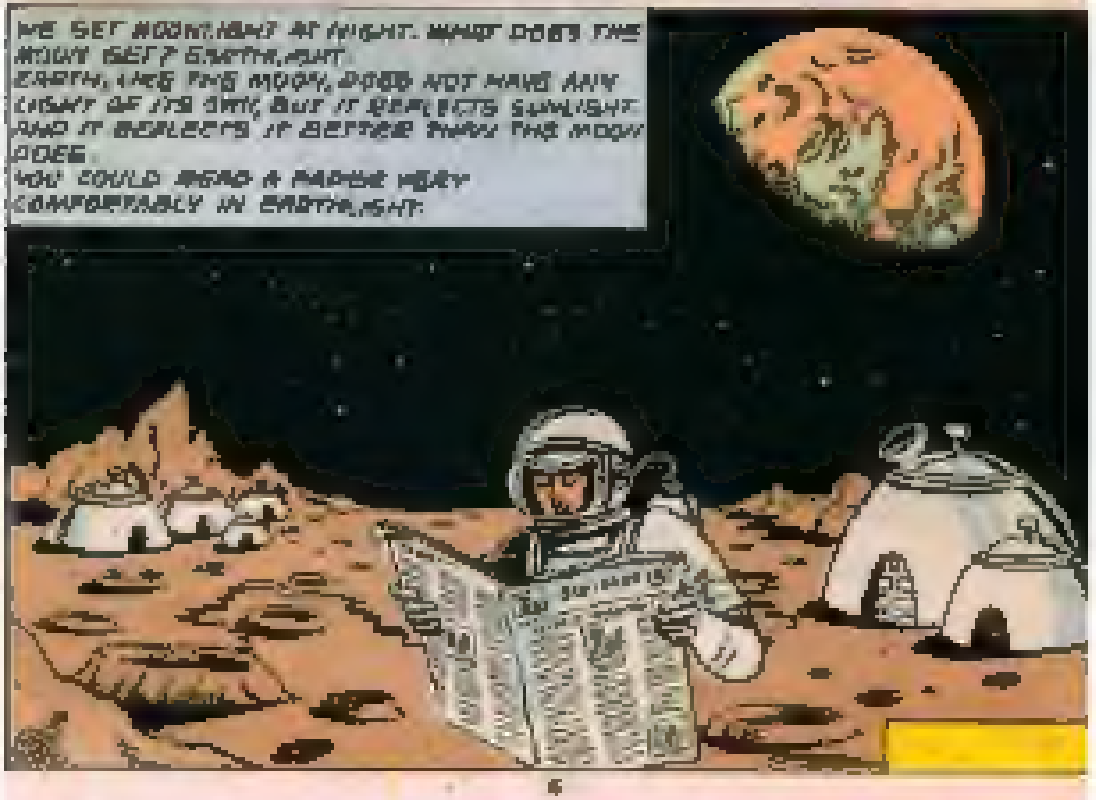
...HE WOULD LEAP INTO A SHADED PLACE...

...AND THERE HE WOULD SHIVER WITH COLD.

ON EARTH, HEAT IS CARRIED FROM ONE PLACE TO ANOTHER BY AIR AS THERE IS NO AIR ON THE MOON, HEAT STAYS WHERE IT IS WITHOUT SPREADING AROUND.
THE AREA EXPOSED TO SUNLIGHT BECOMES VERY, VERY HOT.
BUT SHADED PLACES REMAIN BITTERLY COLD.
THE WHOLE LAND BECOMES BITTERLY COLD THE MOMENT THE SUN GOES DOWN.
AT MIDNIGHT THE TEMPERATURE ON THE MOON IS -150°C.




IT MAY SURPRISE MANY OF YOU TO KNOW THAT THE MOON ALSO HAS DAYS AND NIGHTS.
BUT DAYLIGHT THERE GOES ON FOR ABOUT TWO WEEKS OF OUR TIME AND WHEN NIGHT FINALLY COMES, IT TOO SLOGGOHES ON FOR ABOUT TWO WEEKS.
ANOTHER TWO DAYS FOR DAY-BREAK.


WE GET MOONLIGHT AT NIGHT. WHAT DOES THE MOON GET? EARTHLIGHT.
EARTH, LIKE THE MOON, DOES NOT HAVE ANY LIGHT OF ITS OWN. BUT IT REFLECTS SUNLIGHT AND IT REFLECTS IT BETTER THAN THE MOON DOES.
YOU COULD READ A NEWSPAPER VERY COMFORTABLY IN EARTHLIGHT.

THE MOON — Our strange neighbour — 3

Text: J D Iyer • Illustrations: Anand Mandi

THE MOON GOES ROUND THE EARTH. IT MOVES VERY FAST, COVERING ABOUT 60,000 KM. PER DAY.
YET IT TAKES 27 1/3 DAYS TO CIRCLE THE EARTH ONCE. AS IT GOES ROUND THE EARTH, IT ALSO SPINS LIKE A TOP.
A TOP SPINS VERY FAST. IT TAKES NO TIME AT ALL TO MAKE ONE TURN. BUT THE MOON SPINS VERY SLOWLY IN COMPARISON. IT TAKES 27 1/3 DAYS TO MAKE ONE TURN. YOU WILL NOTICE THAT IT TAKES THE SAME NUMBER OF DAYS TO TURN ONCE ROUND itself AND TO MAKE ONE CIRCLE ROUND THE EARTH.

IF YOU KEEP A CHAIR IN THE CENTRE OF A ROOM AND GO ROUND IT IN AN ANTI-CLOCKWISE DIRECTION, IT IS YOUR LEFT SIDE WHICH WILL BE TURNED TOWARDS IT ALL THE TIME.

SIMILARLY, AS THE MOON TRAVELS ROUND THE EARTH, IT KEEPS THE SAME SIDE TURNED TOWARDS THE EARTH. WHEN GALILEO LOOKED AT THE MOON THROUGH HIS TELESCOPE, IT WAS THE SIDE THAT HE SAW.
NOBODY KNEW WHAT THE HIDDEN SIDE OF THE MOON LOOKED LIKE UNTIL 1959. IN THAT YEAR THE RUSSIAN SPACE-CRAFT, LUNA 3, PASSED BEHIND THE MOON, TOOK PICTURES AND SENT THEM BACK TO EARTH.
IT WAS FOUND THAT THE HIDDEN SIDE LOOKED VERY MUCH LIKE THE SIDE TURNED TOWARDS US.

HAVE A LOOK AT THE FRIENDLY FACE OF THE MOON (THE SIDE FACING US). THERE ARE PLACES WITH NAMES LIKE SEA OF CLOUDS (MARE NUBIUM), SEA OF NECTAR (MARE NECTAR) AND SEA OF RAINS (MARE IMBRIUM). ACTUALLY THERE ARE NO SEAS OR RIVERS OR POND ON THE MOON. IN FACT, THERE IS NOT A DROP OF WATER THERE.
THE AREAS MENTIONED ARE FAIRLY SMOOTH PLAINS.

JUST AS THE MOON TRAVELS ROUND THE EARTH, THE EARTH TRAVELS ROUND THE SUN.
ONCE A MONTH, THE SUN, EARTH AND MOON ARE IN THE POSITION

EARTH

MOON

SUN

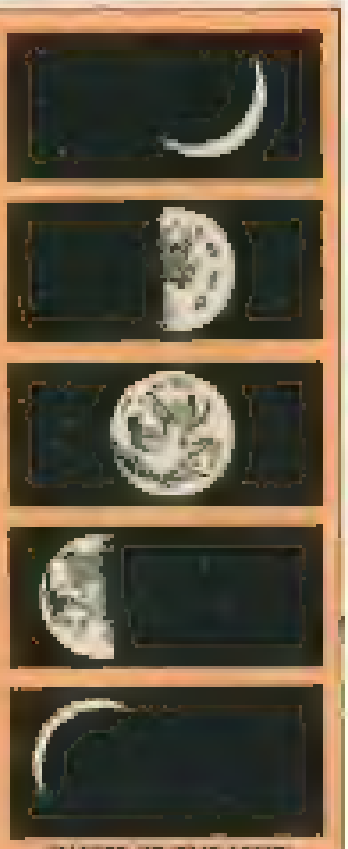
THE SIDE OF THE MOON TURNED TOWARDS THE EARTH IS NOT LIGHTED UP BY THE SUN AND SO WE CAN'T SEE THE MOON AT ALL. WE SAY IT IS A NEW MOON.

TWO WEEKS LATER, THE SUN, THE EARTH AND THE MOON ARE IN THIS POSITION —

THEN THE SUN CAN SHINE ON THE SIDE OF THE MOON WHICH IS TOWARDS US AND WE SEE A FULL MOON.

ANOTHER TWO WEEKS AND THE THREE BODIES ARE BACK IN THE FIRST POSITION. IN BETWEEN, SOME BUT NOT ALL OF THE MOON'S LIGHTED SIDE IS TURNED TOWARDS US AND WE SEE THE MOON BECOMING EITHER FULLER AND FULLER OR THINNER AND THINNER.

SO EVEN THOUGH ONE HALF OF THE MOON IS ALWAYS LIGHTED BY THE SUN, WE CAN SEE THE FULL LIGHTED SIDE OF THE MOON ONLY ONCE A MONTH. THE REST OF THE TIME WE CAN SEE ONLY PARTS OF THE LIGHTED SIDE AND AT NEW MOON WE CAN'T SEE IT AT ALL.
IF WE WERE WATCHING OUR EARTH FROM THE MOON WE WOULD SEE OUR EARTH TOO IN VARIOUS SHAPES AND SIZES!

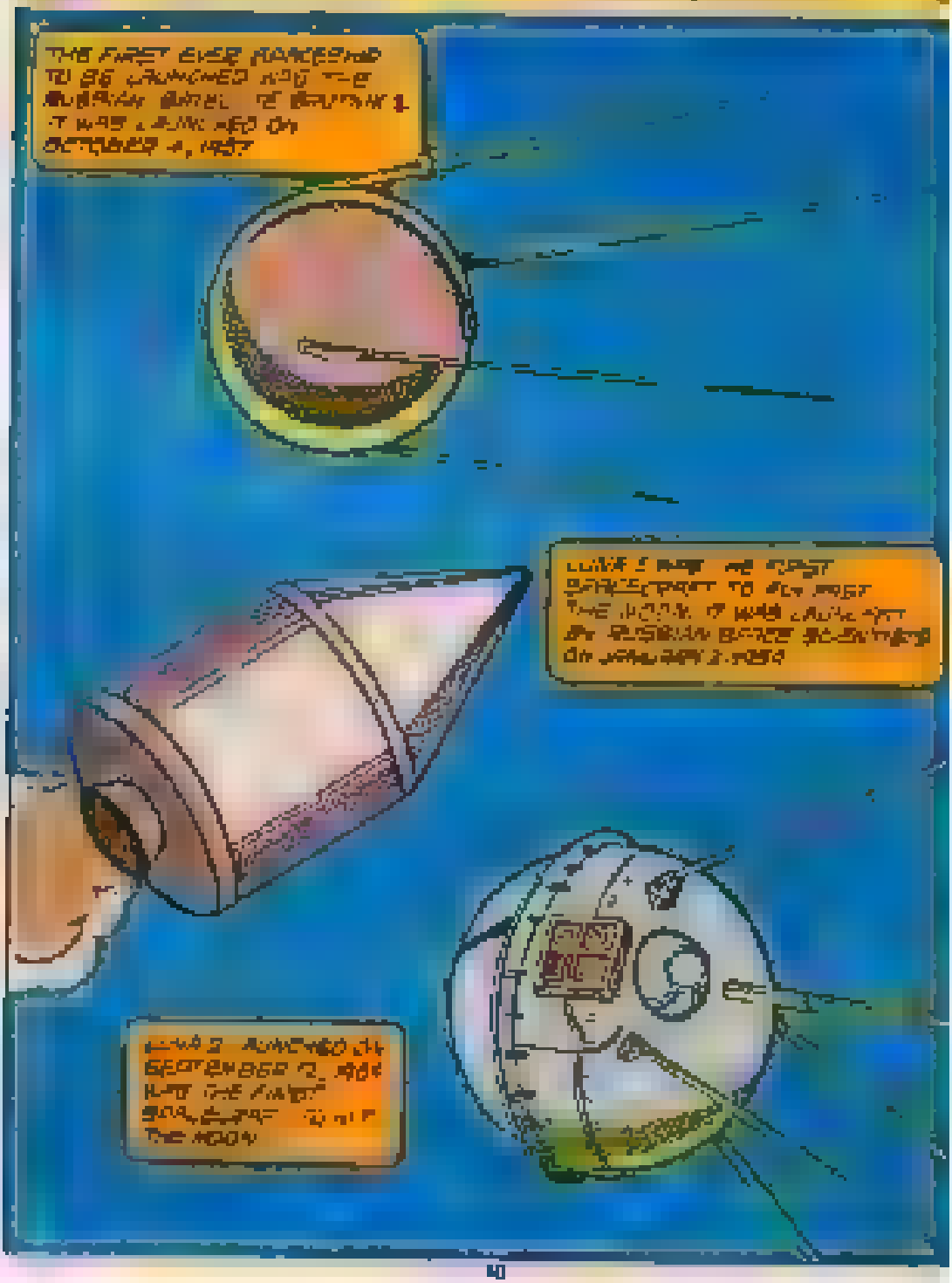


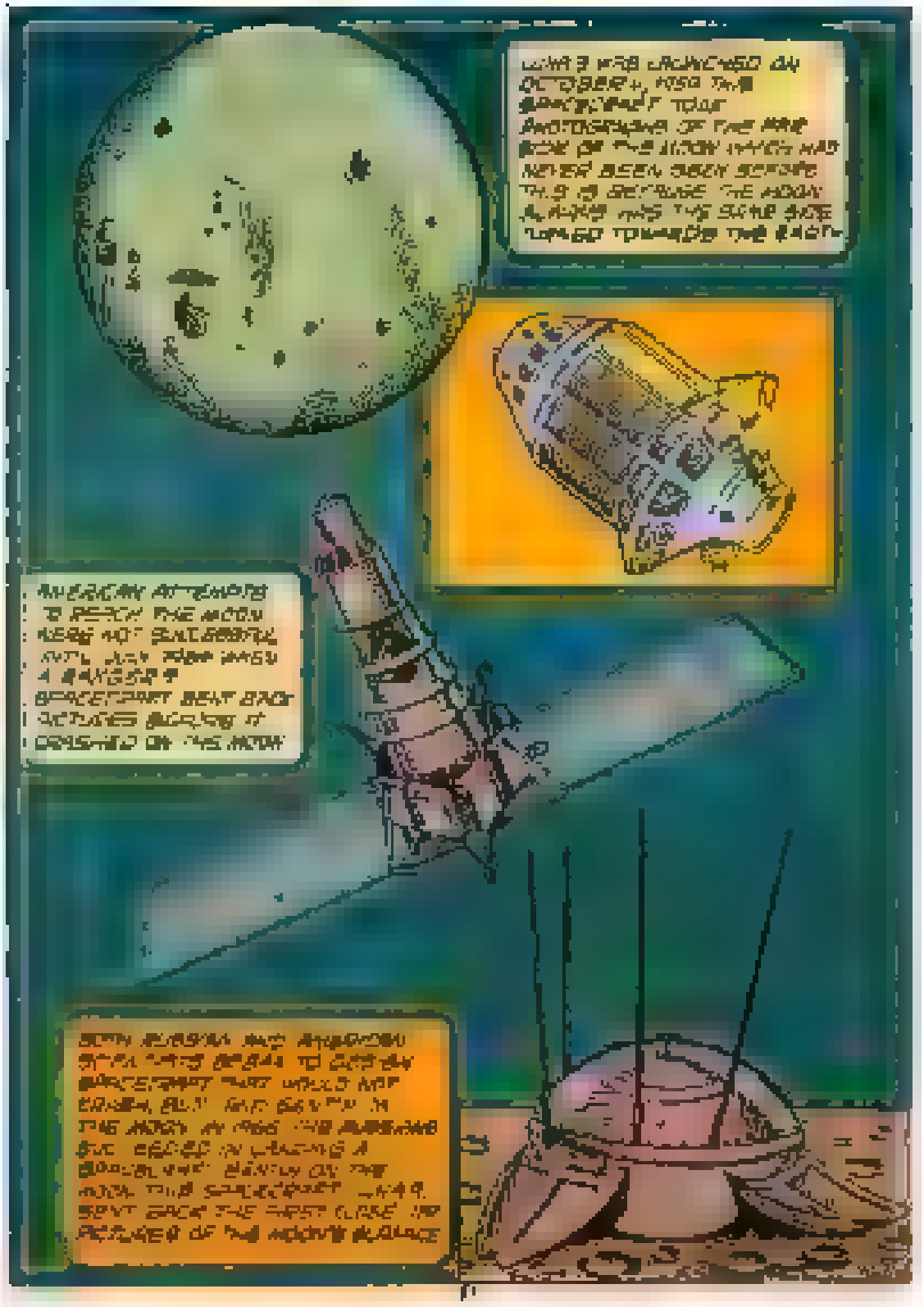
PHASES OF THE MOON.

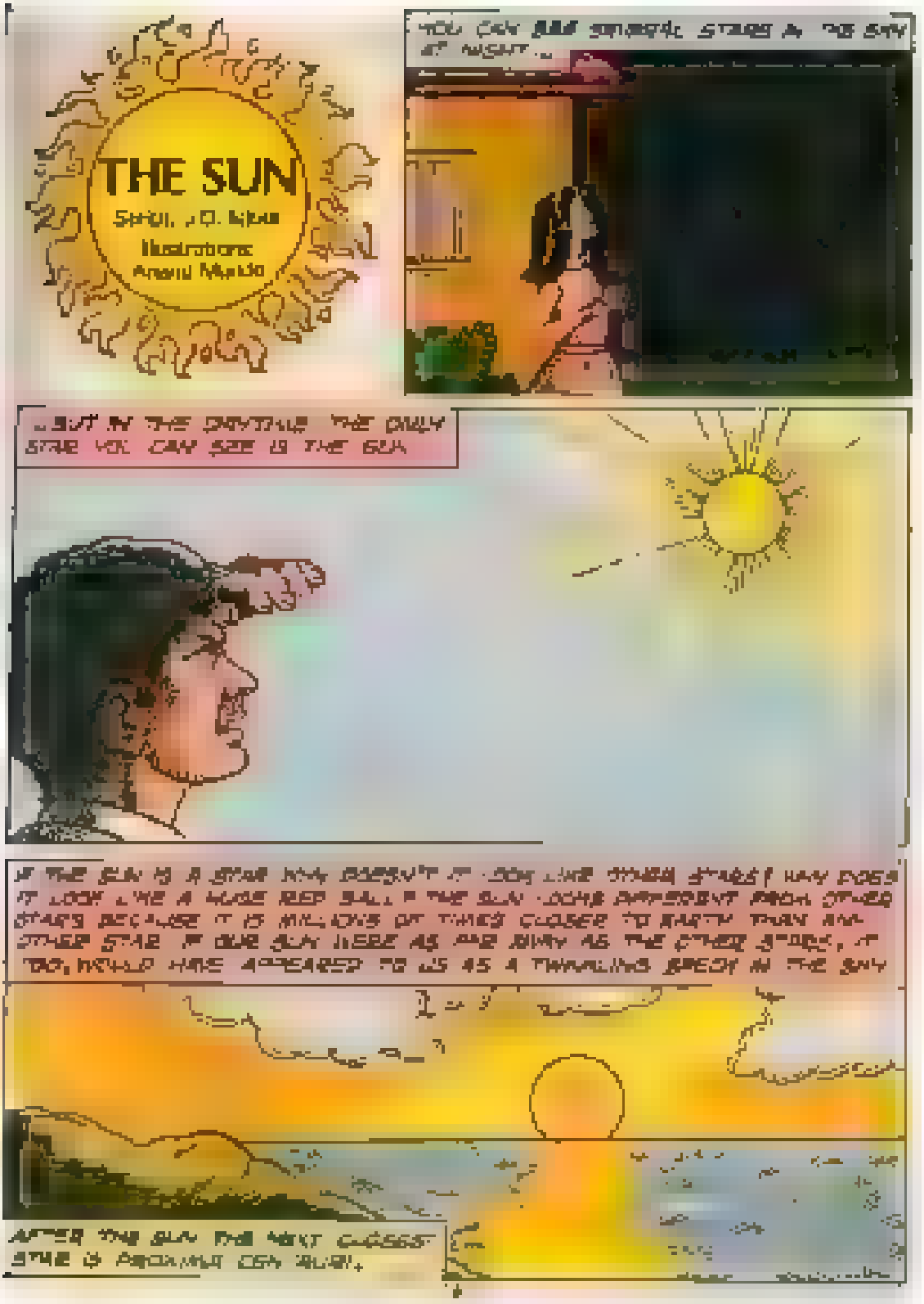
The race to the moon

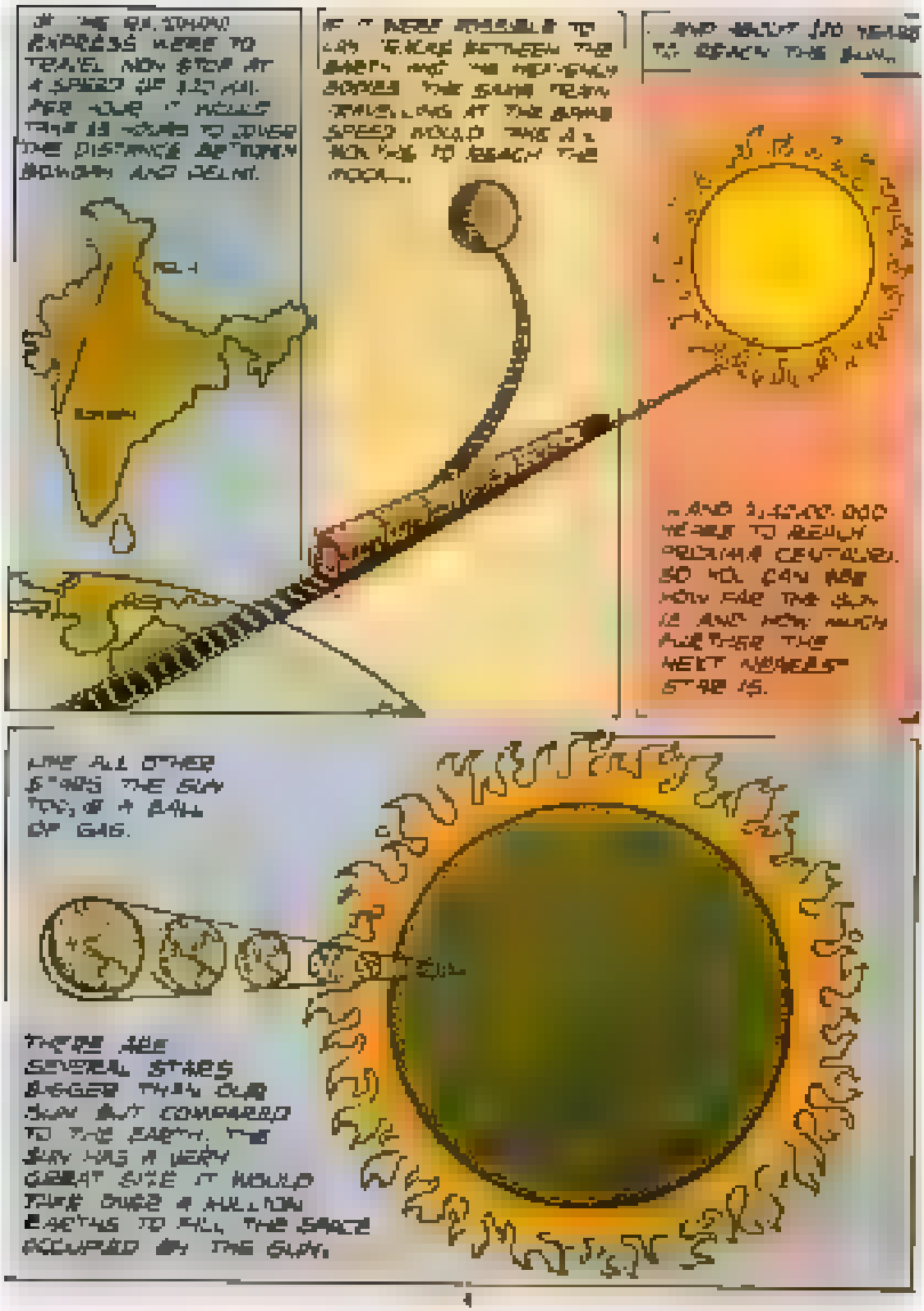
Script: J.D. Morr

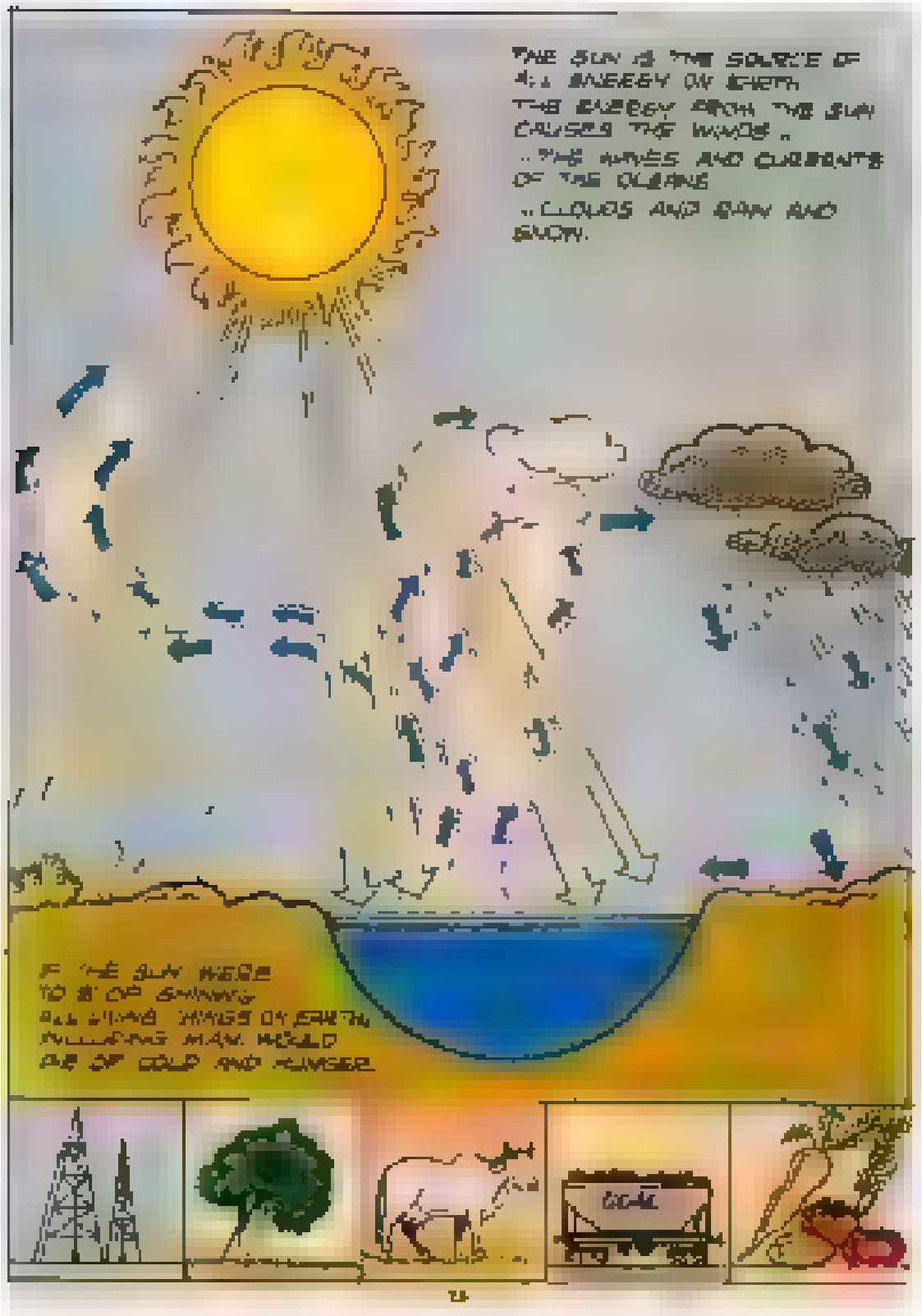
Illustrations: Anand Manda

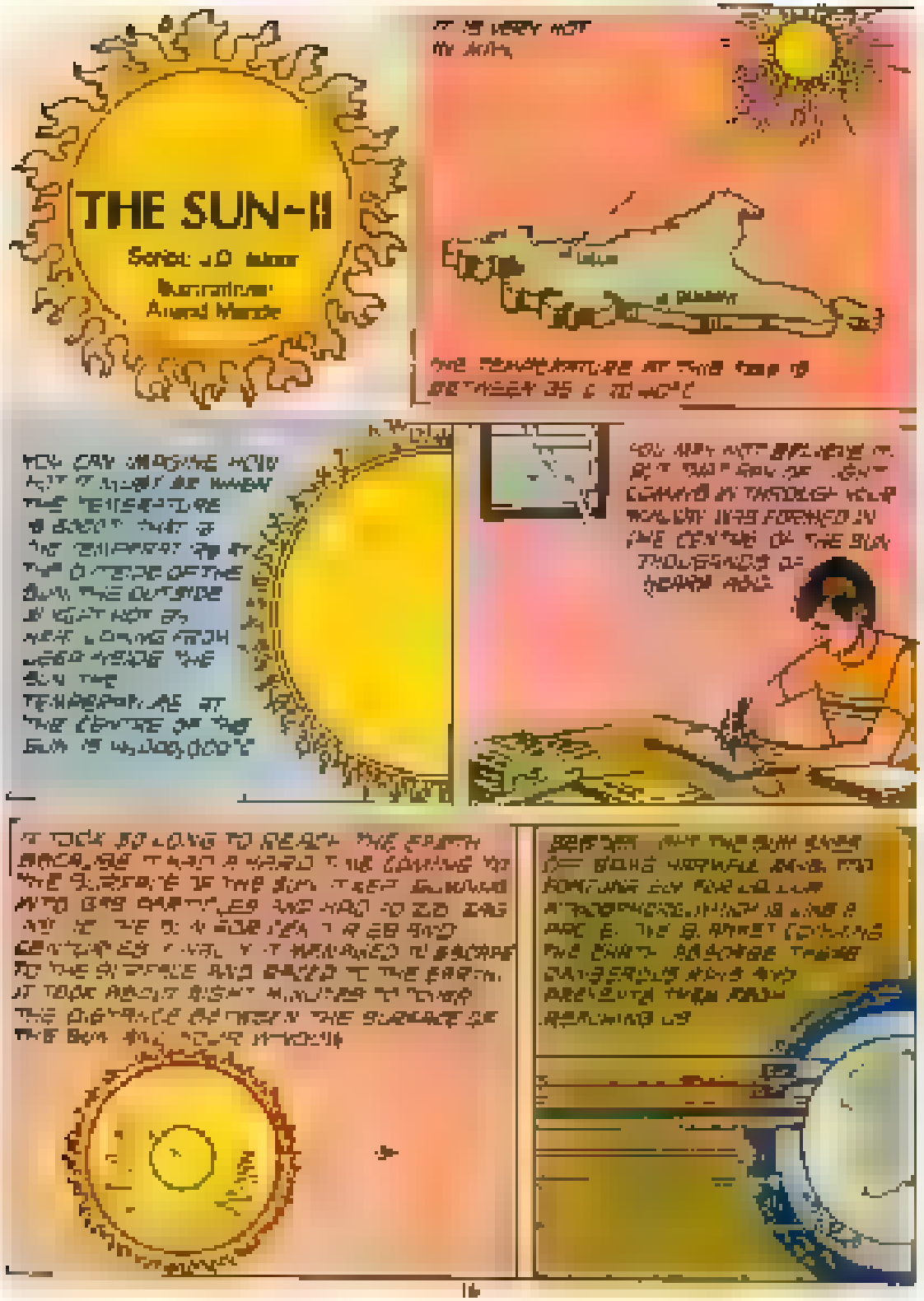



LUNA 3 WAS LAUNCHED ON OCTOBER 4, 1959 THE SPACECRAFT TOOK PHOTOGRAPHS OF THE FAR SIDE OF THE MOON WHICH HAD NEVER BEEN SEEN BEFORE THIS IS BECAUSE THE MOON ALWAYS HAS THE SAME SIDE TURNED TOWARDS THE EARTH
AMERICAN ATTEMPTS TO REACH THE MOON HERE NOT SUCCESSFUL UNTIL JULY 1964 WHEN A RANGER SPACECRAFT SENT BACK DETAILED IMAGES BEFORE CRASHING ON THE MOON
BOTH RUSSIA AND AMERICAN SCIENTISTS BEGAN TO DESIGN SPACECRAFT THAT WOULD NOT CRASH BUT GENTLY LAND ON THE MOON AT ONE THE RUSSIANS BUT DECIDED ON LAUNCHING A SPACECRAFT GENTLY ON THE MOON THE SPACECRAFT LUNA 9 SENT BACK THE FIRST CLOSE UP PICTURES OF THE MOON'S SURFACE


THE SUN
Illustrations:
YOU CAN SEE SPECIAL STARS IN THE SKY AT NIGHT...
...BUT IN THE DAYTIME THE ONLY STAR YOU CAN SEE IS THE SUN.
IF THE SUN IS A STAR, WHY DOESN'T IT LOOK LIKE OTHER STARS? WHY DOES IT LOOK LIKE A HUGE RED BALL? THE SUN LOOKS DIFFERENT FROM OTHER STARS BECAUSE IT IS MILLIONS OF TIMES CLOSER TO EARTH THAN ANY OTHER STAR. IF OUR SUN WERE AS FAR AWAY AS THE OTHER STARS, IT TOO, WOULD HAVE APPEARED TO US AS A TWINKLING SPECK IN THE SKY.
AFTER THE SUN, THE NEXT CLOSEST STAR IS PROXIMA CENTAURI.


IF THE RAJDHANI EXPRESS WERE TO TRAVEL NON STOP AT A SPEED OF 120 KM. PER HOUR IT WOULD TAKE 18 HOURS TO COVER THE DISTANCE BETWEEN BOMBAY AND DELHI.
DELHI
BOMBAY
IF IT WERE POSSIBLE TO DIG A TUNNEL BETWEEN THE EARTH AND THE NEIGHBOURING SUNS THE SAME TRAIN TRAVELLING AT THE SAME SPEED WOULD TAKE 4.3 MONTHS TO REACH THE MOON...
...AND ABOUT 110 YEARS TO REACH THE SUN...
...AND 3,140,000 YEARS TO REACH PROXIMA CENTAURI. SO YOU CAN SEE HOW FAR THE SUN IS AND HOW MUCH FURTHER THE NEXT NEAREST STAR IS.
LIKE ALL OTHER STARS THE SUN TOO IS A BALL OF GAS.
SUN
THERE ARE SEVERAL STARS BIGGER THAN OUR SUN BUT COMPARED TO THE EARTH, THE SUN HAS A VERY GREAT SIZE IT WOULD TAKE OVER 1 MILLION EARTHS TO FILL THE SPACE OCCUPIED BY THE SUN.

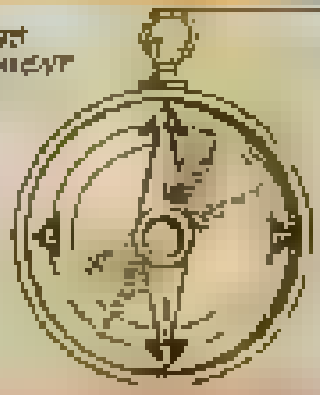

THE SUN IS THE SOURCE OF ALL ENERGY ON EARTH.
THE ENERGY FROM THE SUN CAUSES THE WINDS ..
.. THE WAVES AND CURRENTS OF THE OCEANS
.. CLOUDS AND RAIN AND SNOW.
IF THE SUN WERE TO STOP SHINING ALL LIVING THINGS ON EARTH INCLUDING MAN WOULD DIE OF COLD AND HUNGER.
COAL


THE SUN-II
Series: J.D. Aldrin
Illustrations: Anand Mande
IT IS VERY HOT IN ACTUAL
THE TEMPERATURE AT THE TOP IS BETWEEN 35 & 70 MILLION°C
YOU CAN IMAGINE HOW HOT IT MUST BE WHEN THE TEMPERATURE IS ABOUT THAT IS THE TEMPERATURE AT THE CENTRE OF THE SUN. THE OUTSIDE IS QUITE HOT BY HEAT COMING FROM DEEP INSIDE THE SUN. THE TEMPERATURE AT THE CENTRE OF THE SUN IS 15,000,000°C
YOU MAY NOT BELIEVE IT, BUT THAT ONE OF LIGHT COMING IN THROUGH YOUR WINDOW WAS FORMED IN THE CENTRE OF THE SUN THOUSANDS OF YEARS AGO.
IT TOOK SO LONG TO REACH THE EARTH BECAUSE IT HAD A HARD TIME COMING OUT THE SURFACE OF THE SUN. THEY BOUNCED INTO OTHER PARTICLES AND HAD TO GO BACK AND THE SUN AGAIN. THE SUN IS FULL OF GAS CENTRED FINAL IT MANAGED TO ESCAPE TO THE OUTSIDE AND BEGAN TO THE EARTH. IT TOOK ABOUT EIGHT MINUTES TO COVER THE DISTANCE BETWEEN THE SURFACE OF THE SUN AND EARTH INTO
BEFORE THAT THE SUN WAS BEING VERY HAPPY AND FORTUNE FOR US LIVE ATMOSPHERE. WHICH IS LIKE A BIG BLANKET COVERING THE EARTH. ABSORBS THESE DANGEROUS RAYS AND PREVENTS THEM FROM REACHING US

DISTURBANCES ON THE SUN FOR ASSECT THE EARTH. TOO, ON 18TH NOVEMBER, THE THERE WAS A GREAT EXPLOSION ON THE SUN. SIX HOURS LATER A GIGANTIC CLOUD OF MAGNETICALLY GAS FLOWED OUT FROM THE SUN, COLLIDED WITH THE EARTH AT A SPEED OF ABOUT 600 KM A SECOND.

FOR HOURS ALL LONG DISTANCE RADIO COMMUNICATIONS WERE BLACKED OUT.

COMPASS NEEDLES WENT HAYWIRE



MEANWHILE ALL TO LOST CONTACT WITH THE GROUND STATIONS

IN SOME PARTS OF THE WORLD ELECTRIC LIGHTS FLICKERED AS IF A STORM WET THE SKY. BUT HERE CLEAR AND BLUE! SOME OF THE PS WORKERS LASTED FOR MORE THAN A WEEK!

THE SUN-III

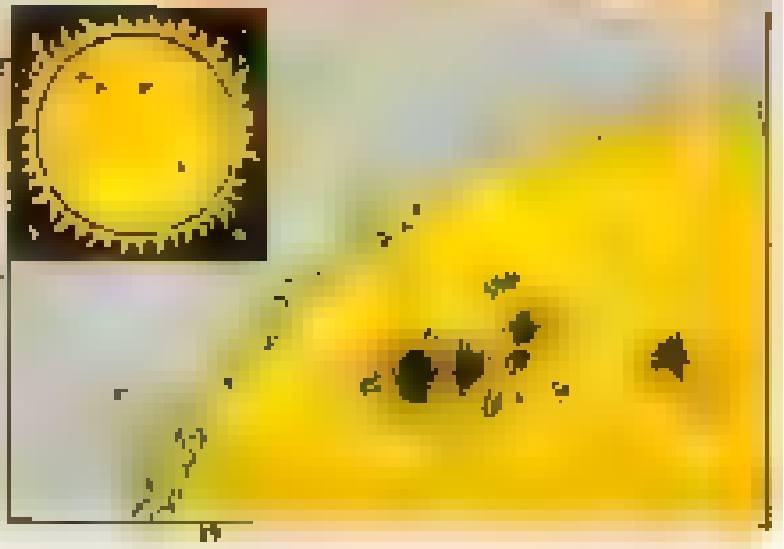
Script J.D. Isaac

Illustration Anand Mavle

SCHWARZE HAS A SIMPLE SUN AND WORKED THE MOST BRIGHT BY A CHEMISTS

HE LOVED ASTRONOMY. HE WANTED TO STUDY THE MOON AND THE STARS BUT HE CANNOT STUDY THE MOON AND THE STARS DUE TO THE DAY AND THAT HAS THE ONLY TIME HE WAS AFRAID. SO HE STARTED STUDYING THE SUN. WATCHED

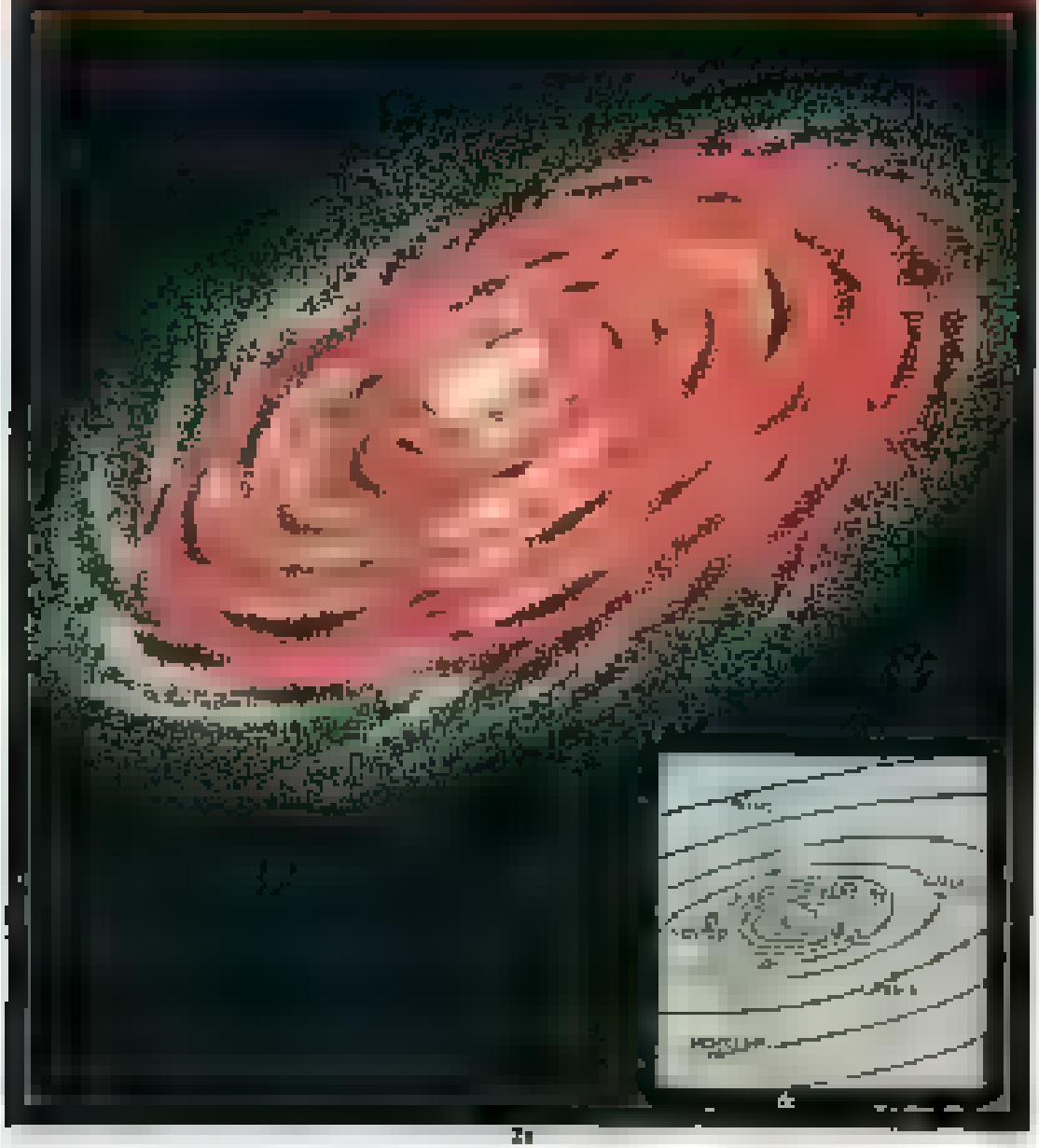
AN INTERESTING FEATURE ABOUT THE SUN IS SUNSPOTS. THERE ARE DARK SPOTS WHICH APPEAR ON THE BRIGHT SURFACE OF THE SUN. THOSE SPOTS ARE ACTUALLY AREAS WHERE THE SUN'S SURFACE IS SOMEWHAT COOLER THAN NORMAL, ABOUT 1000 WATTS OF 6000°C.



OUR SOLAR SYSTEM—1

Script: J.B. Moor
Illustrations:
Anand Mahida

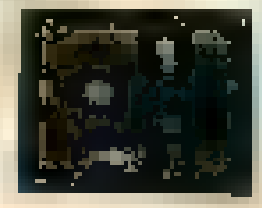
THERE ARE MANY MANY GALAXIES IN THE UNIVERSE.
ONE OF THEM WE CALL THE MILKY WAY.
THE MILKY WAY IS MADE UP OF COUNTLESS STARS
AT ITS CENTRE, THE STARS ARE PACKED CLOSELY TOGETHER
BUT THE STARS BECOME FEWER TOWARDS THE EDGE. TWO THIRDS AWAY FROM
THE CENTRE THERE IS AN ORDINARY YELLOWISH STAR. THIS STAR IS OUR SUN
AROUND WHICH OUR EARTH AND THE OTHER PLANETS REVOLVE

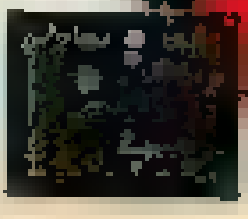


FIVE PLANETS CAN BE SEEN WITH THE NAKED EYE
SO IN ANCIENT TIMES AND EVEN AS LATE AS THE 18TH CENTURY PEOPLE THOUGHT THERE WERE ONLY FIVE OTHER PLANETS BESIDES EARTH
ELSEWHERE WAS THEREFORE VERY SURPRISED WHEN AN ASTRONOMER NAMED HERSCHEL DISCOVERED A SEVENTH PLANET, URANUS IN 1781!
HERSCHEL DISCOVERED URANUS WITH A HUGE TELESCOPE HE HAD CONSTRUCTED.

NOT ANOTHER A. THEY HAD DISCOVERED IN 1846. IT WAS CALLED NEPTUNE

IN 1930 A YOUNG ASTRONOMER NAMED CLYDE TOMBAUGH DISCOVERED A NINTH PLANET. IT WAS NAMED PLUTO. CLYDE TOMBAUGH FOUND PLUTO BY STUDYING THOUSANDS OF PHOTOGRAPHS OF THE REGION OF THE SKY IN WHICH OTHER ASTRONOMERS HAD PREDICTED THAT PLUTO WOULD BE FOUND.



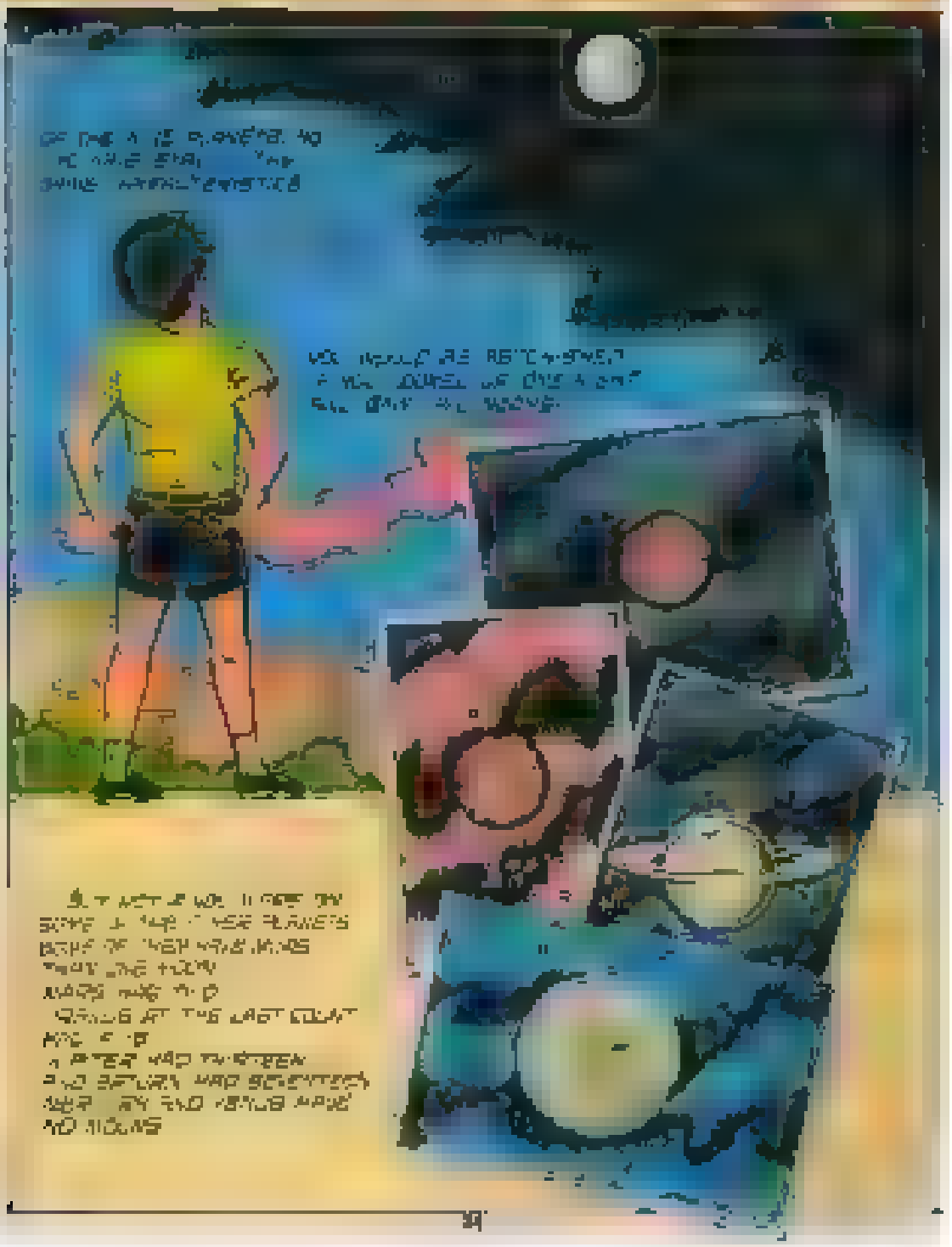


THE PLANETS

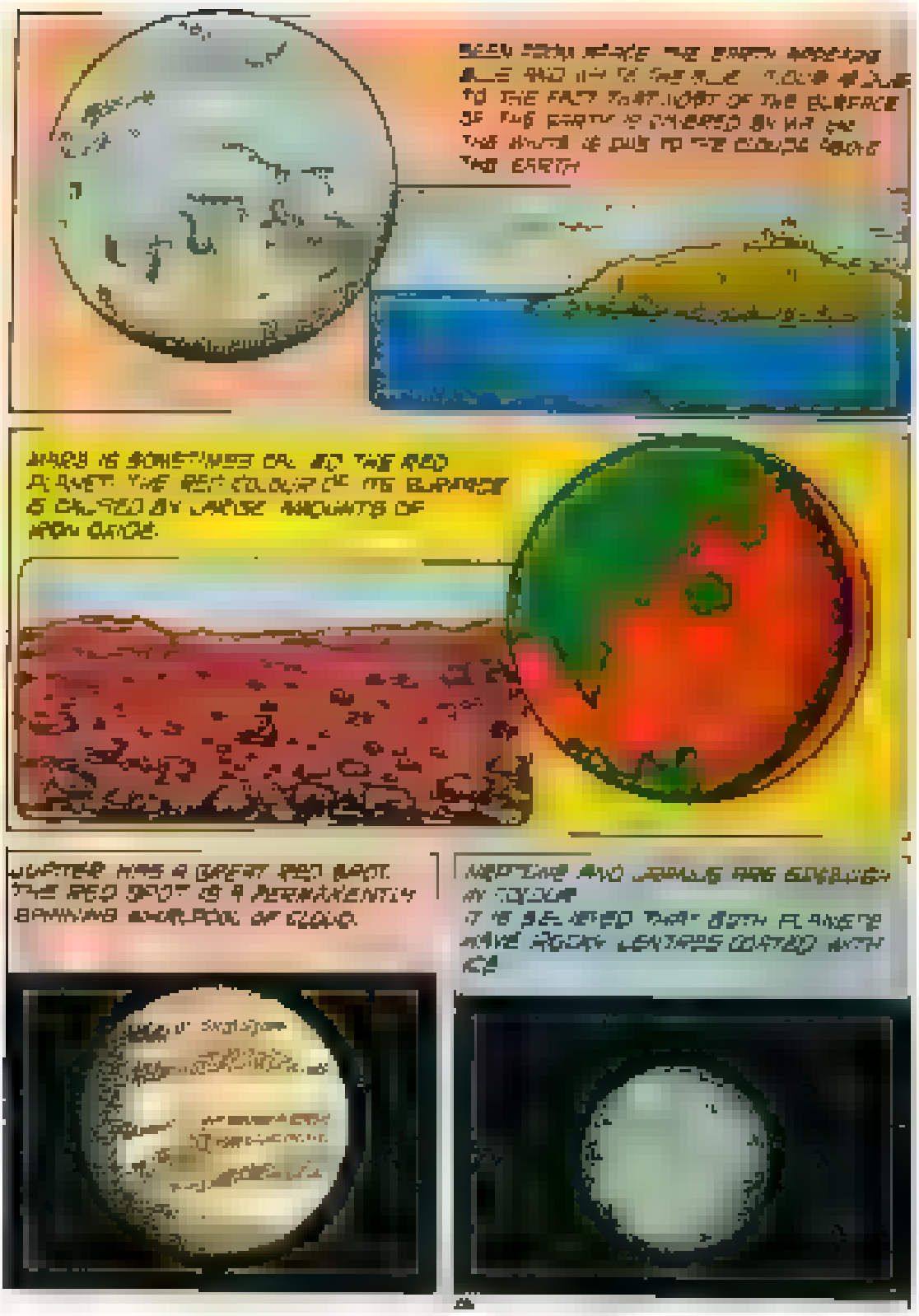
NAME IN ENGLISH	INDIAN NAME	YEAR OF DISCOVERY —
MERCURY	BUDHA	ANCIENT
VENUS	SHUKRA	ANCIENT
EARTH	BHUMANDAL PRITHVI	ANCIENT
MARS	MANGALA	ANCIENT
JUPITER	GURU BRIHASPATI	ANCIENT
SATURN	SHANI	ANCIENT
URANUS		1781
NEPTUNE		1846
PLUTO		1930

OUR SOLAR SYSTEM—2

Science: J. O. Isaacs
Illustrations:
Armand Mastrolia

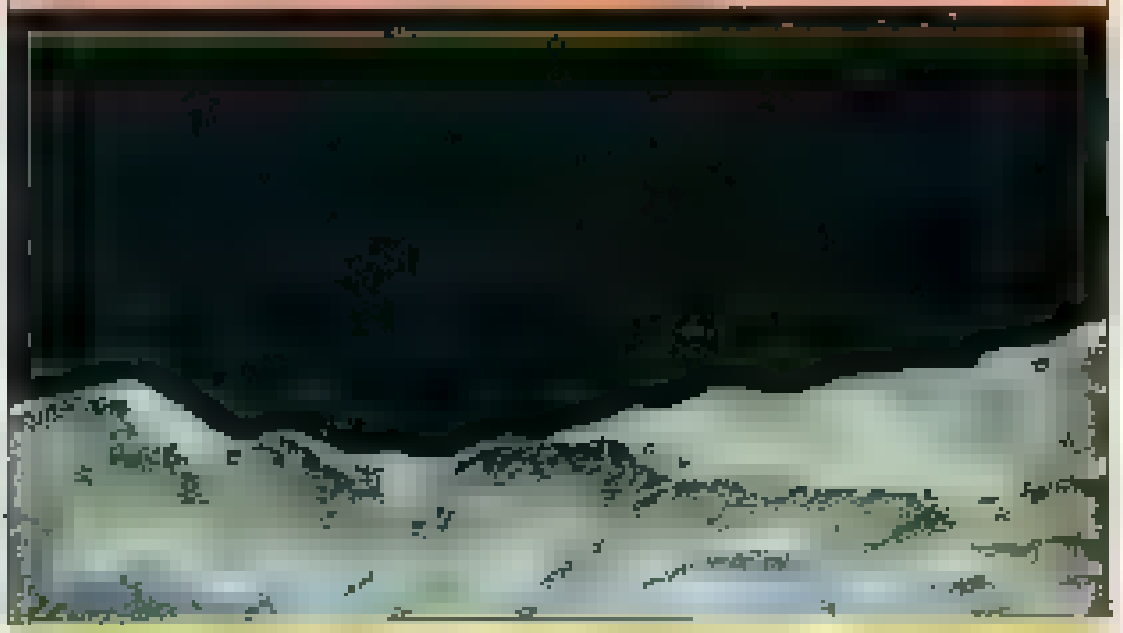


LATEST STUDIES HAVE SHOWN THAT
LARVAE FOR 5 CIRCLE ON MINT PLANET


SEEN FROM SPACE THE EARTH APPEARS BLUE AND IN THE BLUE COLOUR IS DUE TO THE FACT THAT MOST OF THE SURFACE OF THE EARTH IS COVERED BY WATER THE WATER IS BLUE DUE TO THE CLOUDS ABOVE THE EARTH
MARS IS SOMETIMES CALLED THE RED PLANET THE RED COLOUR OF ITS SURFACE IS CAUSED BY LARGE AMOUNTS OF IRON OXIDE.
JUPITER HAS A GREAT RED SPOT THE RED SPOT IS A PERMANENTLY SPINNING WHIRLPOOL OF CLOUD.
NEPTUNE AND URANUS ARE BLUE-GREEN IN COLOUR IT IS BELIEVED THAT BOTH PLANETS HAVE ROCKY CENTRES COATED WITH ICE

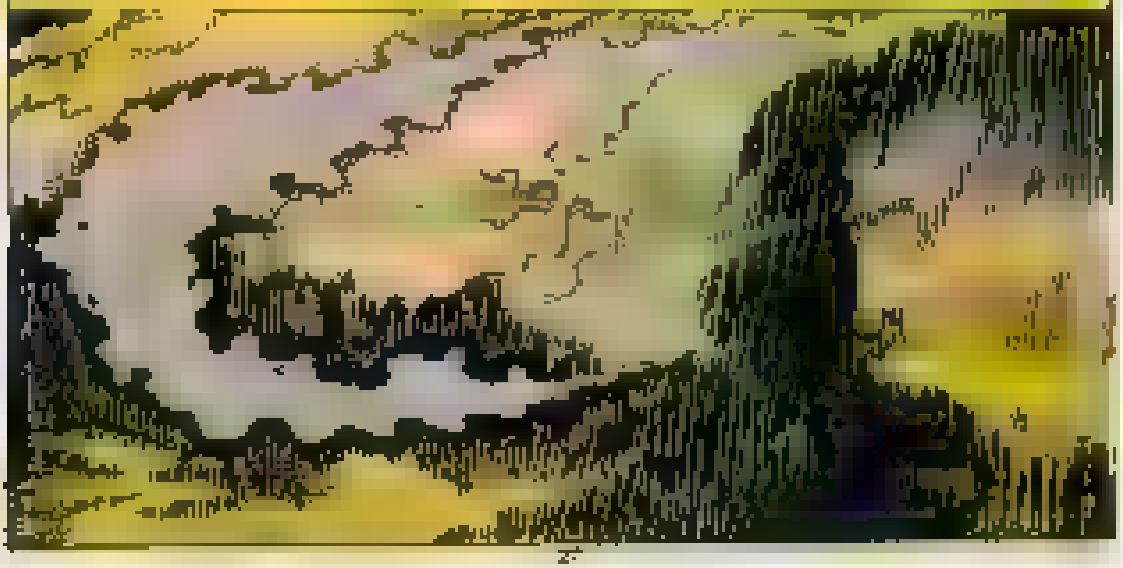
THE COLDEST

PLUTO BEING FARTHEST FROM THE SUN IS THE COLDEST PLANET. IT IS 30° COLD
THAT ALL OF THE GAS WE BREATHE WOULD FREEZE IF WE WERE THERE



AND THE HOTTEST

MERCURY IS CLOSEST TO THE SUN BUT IT IS NOT THE HOTTEST PLANET. THE HOTTEST IS VENUS
VENUS HAS THICK CLOUDS AROUND IT AND THESE CLOUDS PREVENT HEAT FROM ESCAPING FROM THE SURFACE
THE SURFACE TEMPERATURE ON VENUS IS OVER 400°C. HOT ENOUGH TO MELT LEAD!



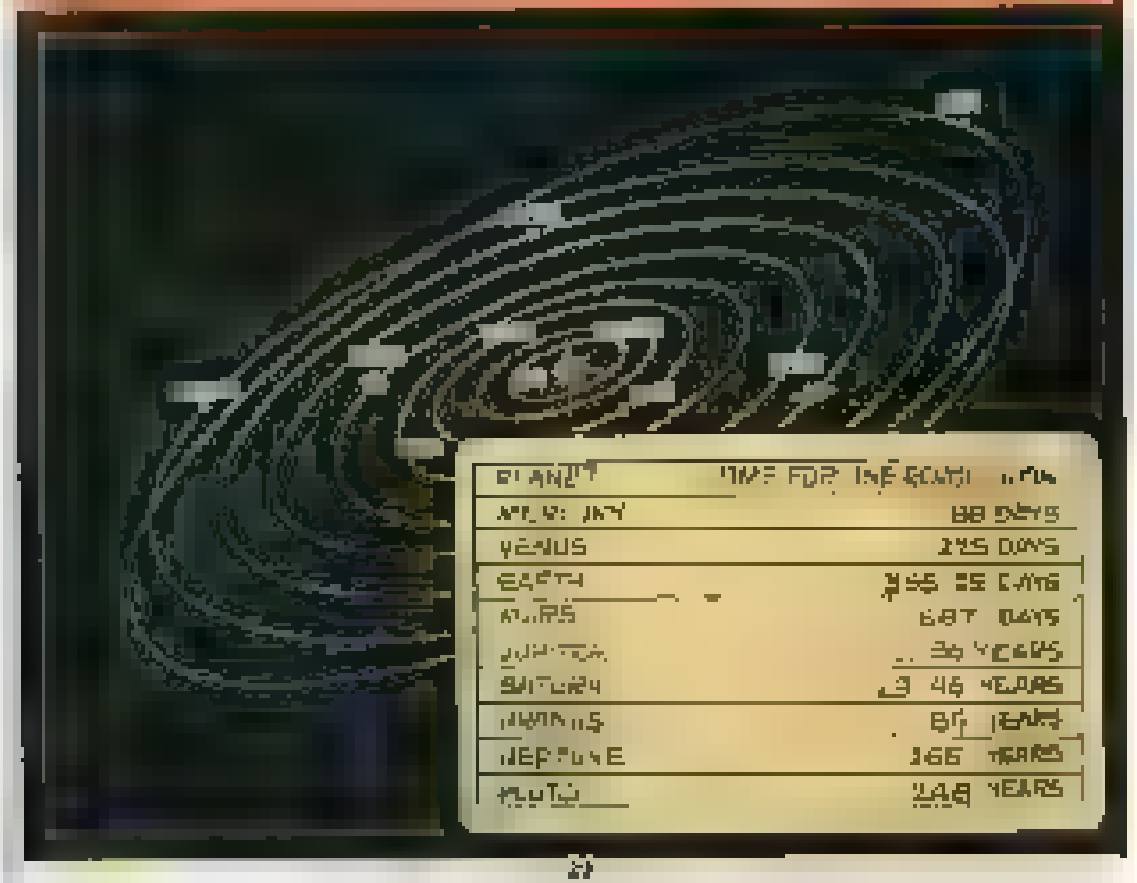
OUR SOLAR SYSTEM—3

Barkat J.D. Intoor
Illustrations
Anand Mandre

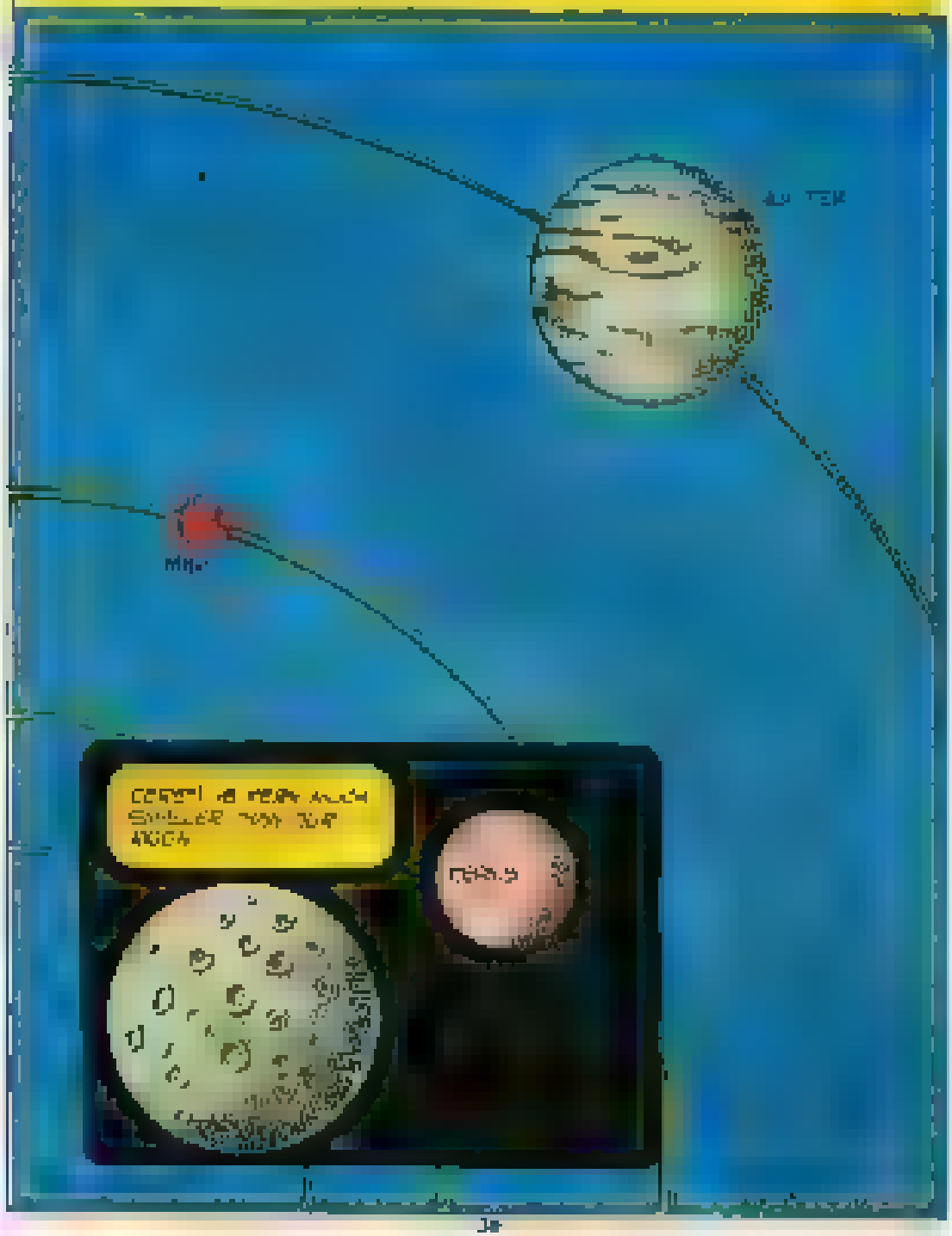
THE EARTH SPINS ONCE A DAY. WHEN WE ROTATE
AS IT SPINS, WE FACE TOWARDS THE SUN. IT LIGHTS UP HALF THE EARTH. ON THE
OTHER SIDE IS DARK
IT IS BECAUSE THE EARTH SPINS THAT WE HAVE DAY AND NIGHT

ALL THE OTHER PLANETS ROTATE SOME SLOWLY, SOME
QUICKLY. SOME ROTATE LIKE THE EARTH, IN A WEST TO EAST
DIRECTION. SOME ROTATE IN THE OPPOSITE DIRECTION.
JUPITER SPINS THE FASTEST. IT SPINS ABOUT ONCE
EVERY TWO EARTH HOURS. SATURN SPINS ABOUT
ONCE EVERY 10 EARTH HOURS. THINGS ALSO SPIN
AROUND TO COMPLETE THE ROTATION

PLANET	TIME FOR ONE ROTATION
MERCURY	59 DAYS
VENUS	243 DAYS
EARTH	23 HOURS 56 MINUTES
MARS	24 HOURS 37 MINUTES
JUPITER	9 HOURS 55 MINUTES
SATURN	10 HOURS 14 MINUTES
URANUS	15 HOURS 37 MINUTES
NEPTUNE	16 HOURS 7 MINUTES
PLUTO	6.4 EARTH DAYS

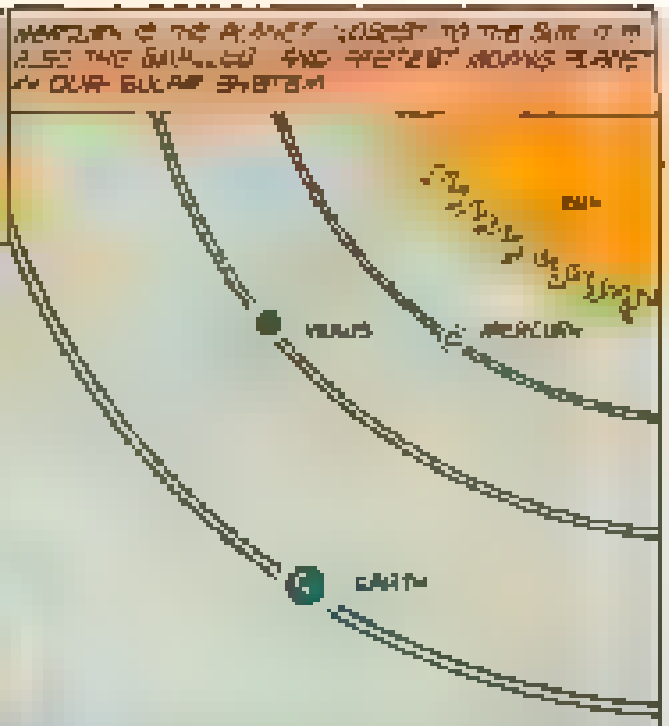

PLANET
TIME FOR THE SOLAR
MERCURY
88 DAYS
VENUS
225 DAYS
EARTH
365.25 DAYS
MARS
687 DAYS
JUPITER
30 YEARS
SATURN
29.46 YEARS
URANUS
84 YEARS
NEPTUNE
165 YEARS
PLUTO
248 YEARS

BETWEEN MARS AND JUPITER THERE ARE THOUSANDS OF MINOR PLANETS. THEY ARE ALL PLANETOIDS OR ASTEROIDS. THE SIZE OF MOST ARE LESS THAN 100 MILES. THERE ARE LARGER. THE LARGEST, CERES, IS ONLY ABOUT 800 MILES WIDE

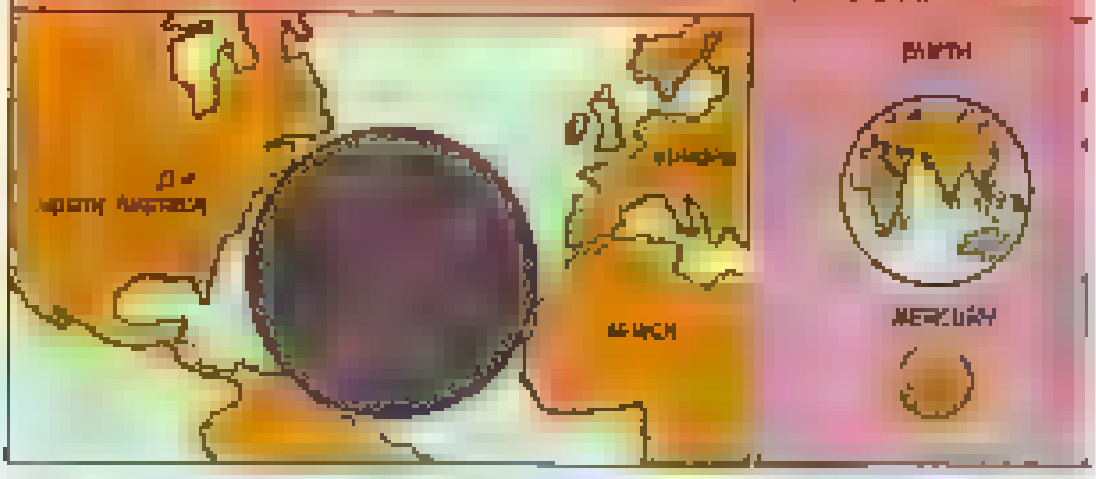


MERCURY

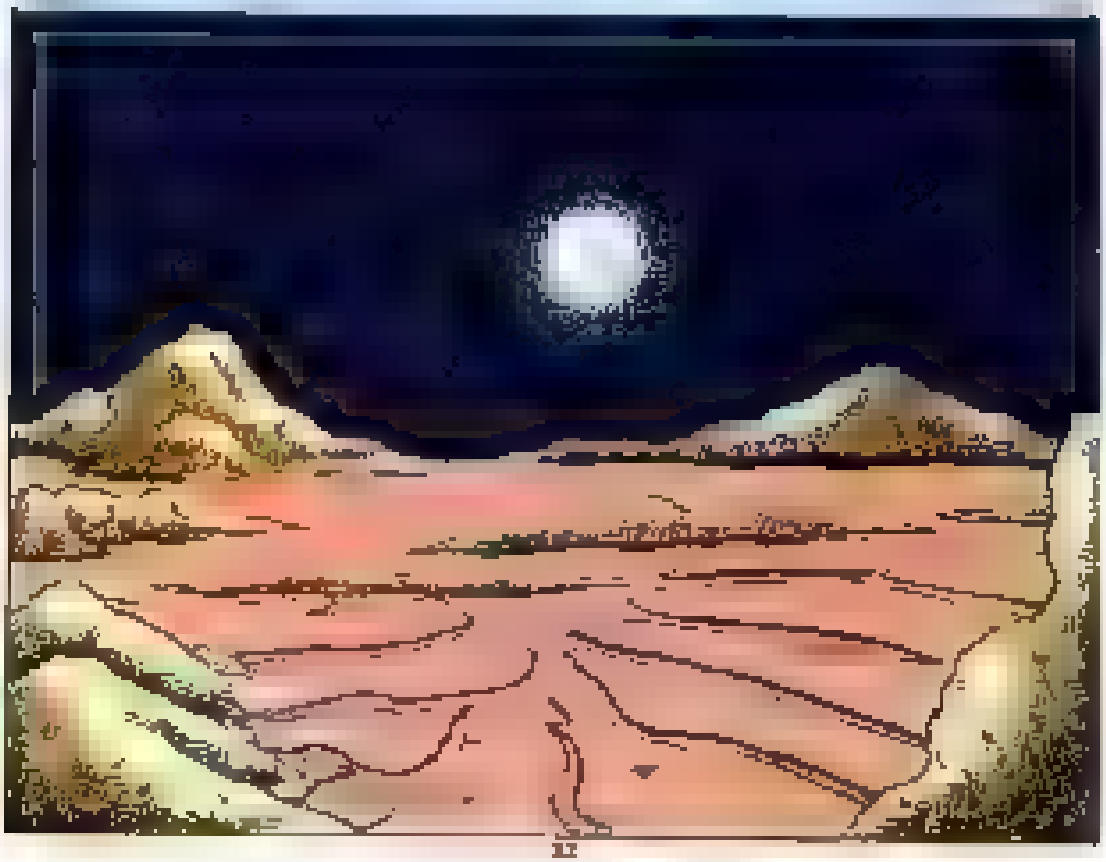
Scripts: J.-P. Isbouc
Illustrations: Astrid Vlaeck

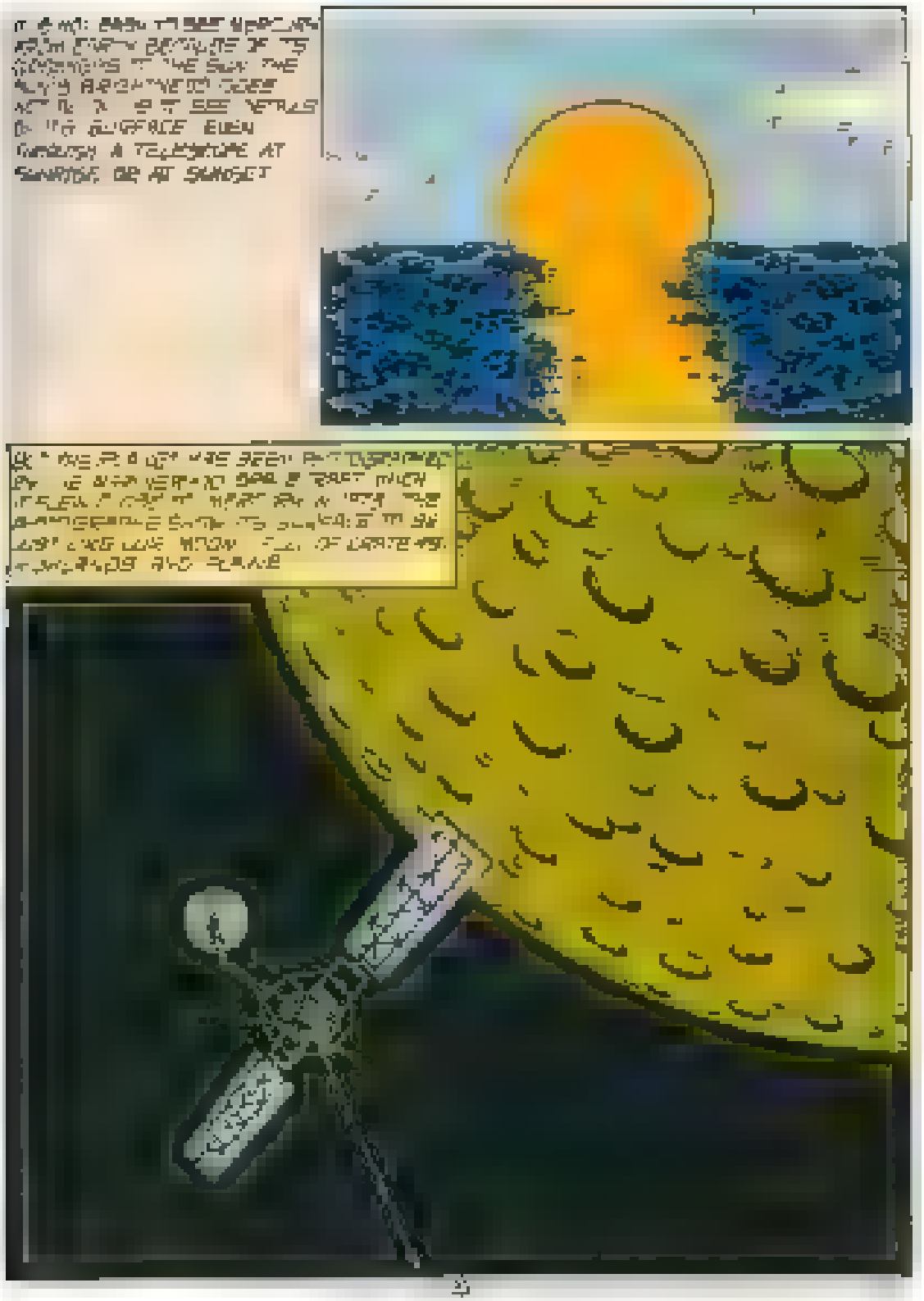


MERCURY IS ABOUT THE SIZE OF PLUTO, THE PLANET FARTHEST FROM THE SUN AND IS SLIGHTLY LARGER THAN OUR MOON. IT IS 3,030 MILES IN DIAMETER. IF MERCURY WERE PUT IN TO THE ATLANTIC OCEAN HERE, IT WOULD BE BROUGHT ON TO THE EARTH.

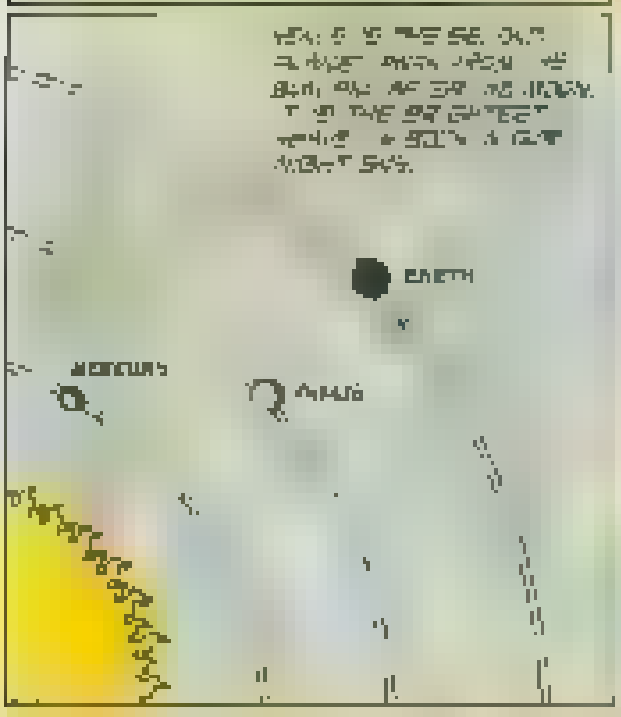


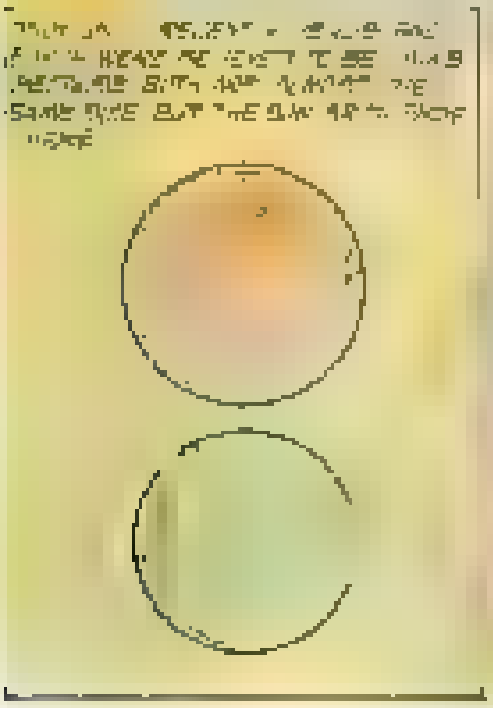
BEING CLOSER TO THE SUN, MERCURY RECEIVES MORE HEAT AND LIGHT FROM THE SUN. WHAT IS THERE BIGGER ON MERCURY THAN IT DOES TO US ON EARTH. THE SUN SEEMS VERY LARGE BECAUSE MERCURY HAS NO ATMOSPHERE AND ITS ONLY 7 MILES. THE TEMPERATURE IS AS HIGH AS 800°F. AT NIGHT THE TEMPERATURE DROPS TO 300°F.

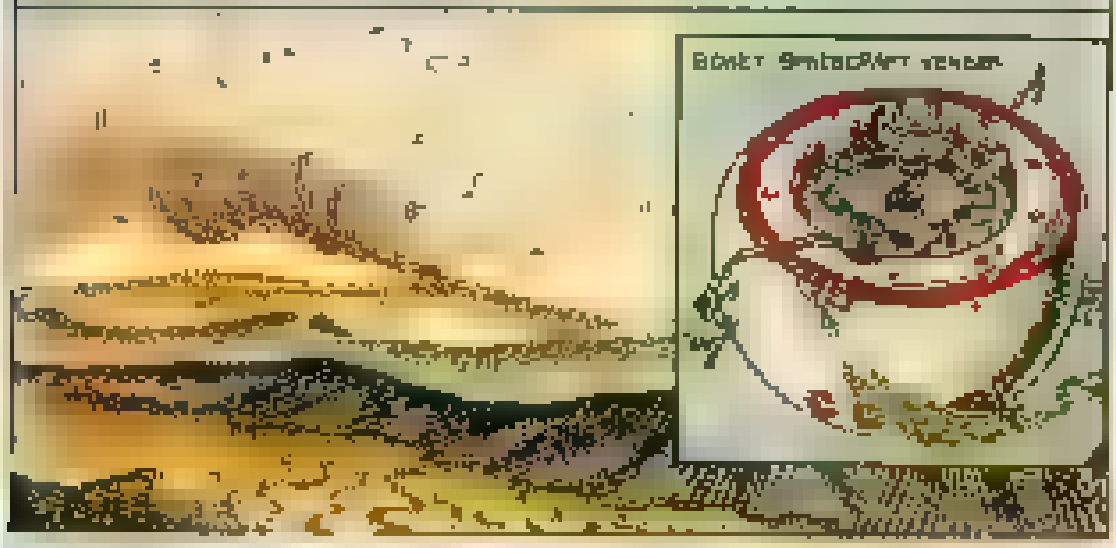



IT IS NOT: EVEN TO SEE MERCURY
FROM EARTH BECAUSE OF ITS
NEARNESS TO THE SUN. THE
PLANET'S PERIHELION OCCURS
AT 0.3 A.U. SO IT SEE DETAILS
OF ITS SURFACE EVEN
THROUGH A TELESCOPE AT
SUNRISE OR AT SUNSET
OK, THE ZONE OF LIGHT HAS BEEN PENETRATED
BY THE SUN'S RAYS AND IT SEEMS PRETTY MUCH
IT FEELS A LOT OF HEAT. SO IN THIS THE
SUNSCREENS SUITS ITS SUNLIGHT TO BE
VERY CLOSE LIKE MOON. FULL OF CRATERS AND
MOUNTAINS AND PLAINS

VENUS

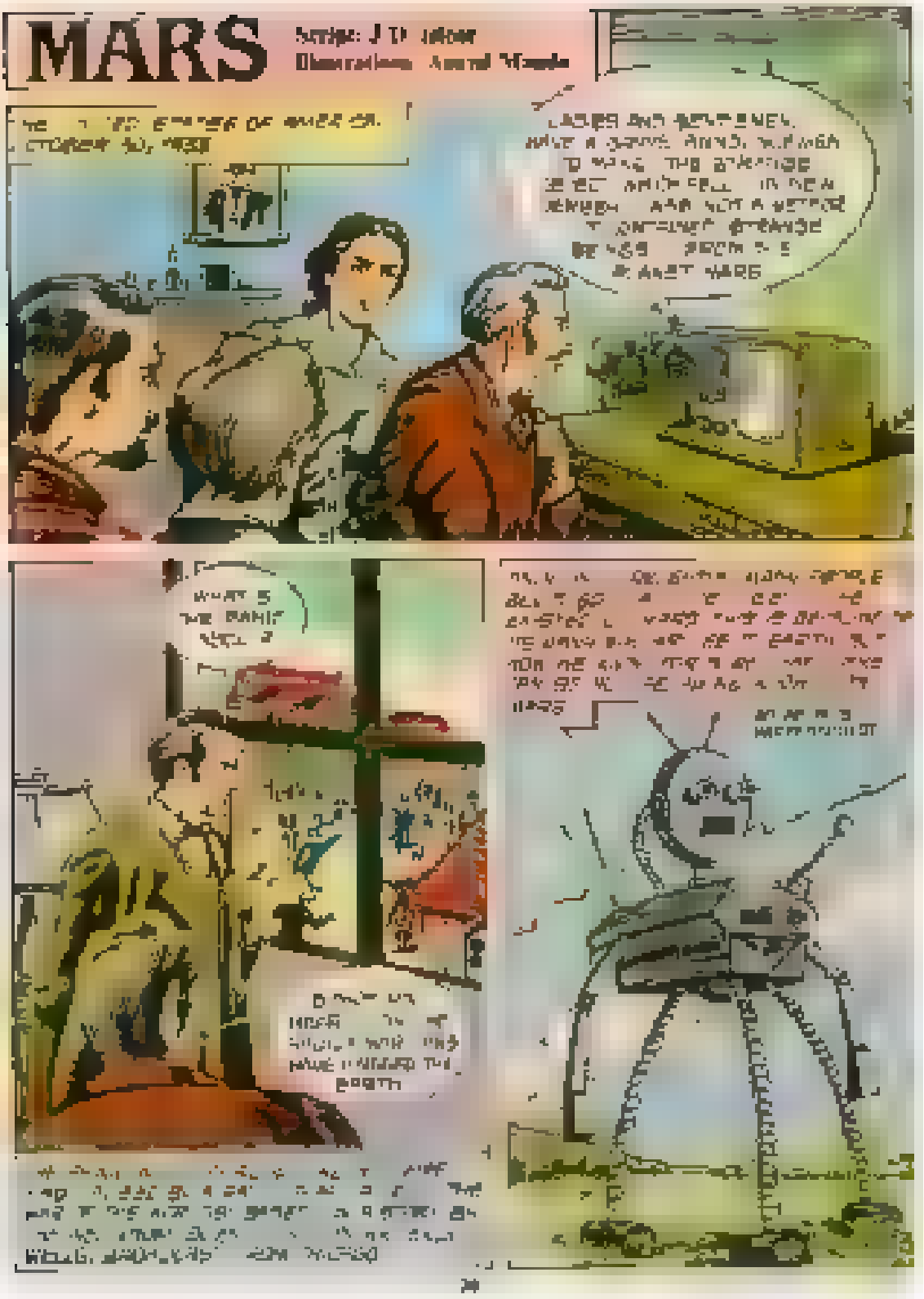


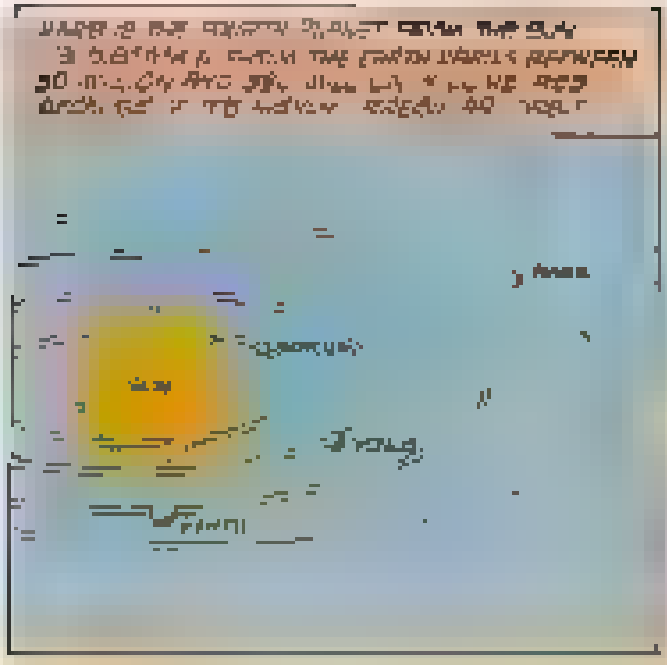


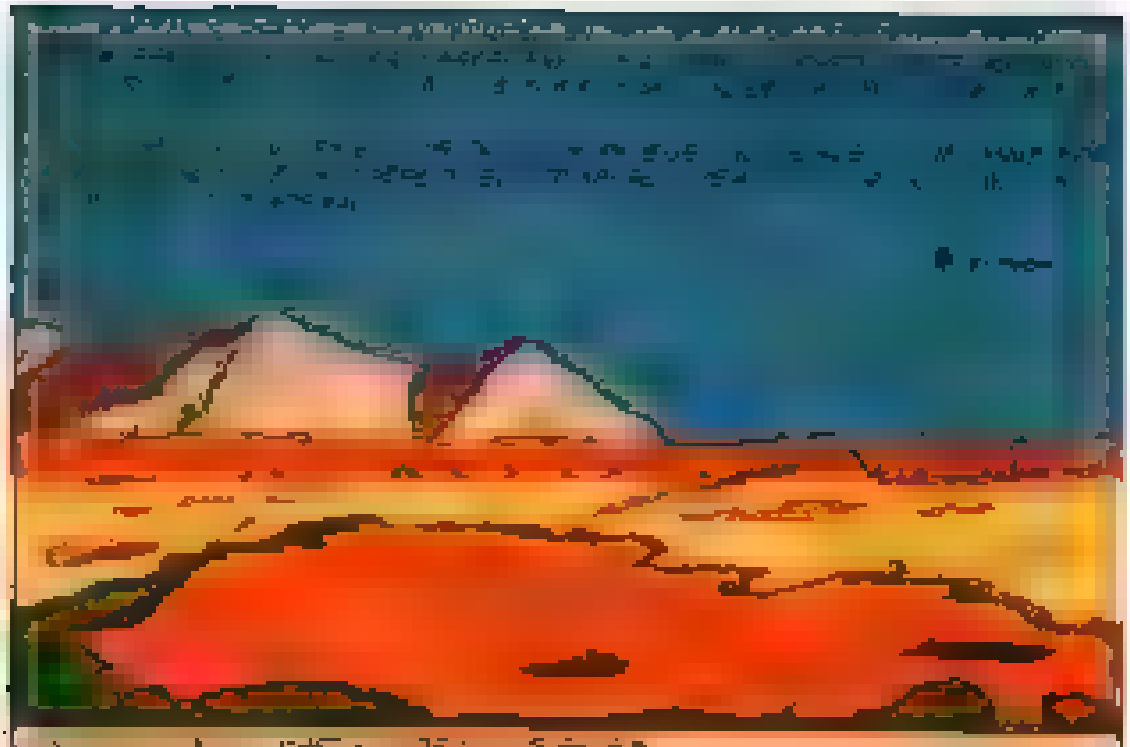

BONET SPACECRAFT VENUS

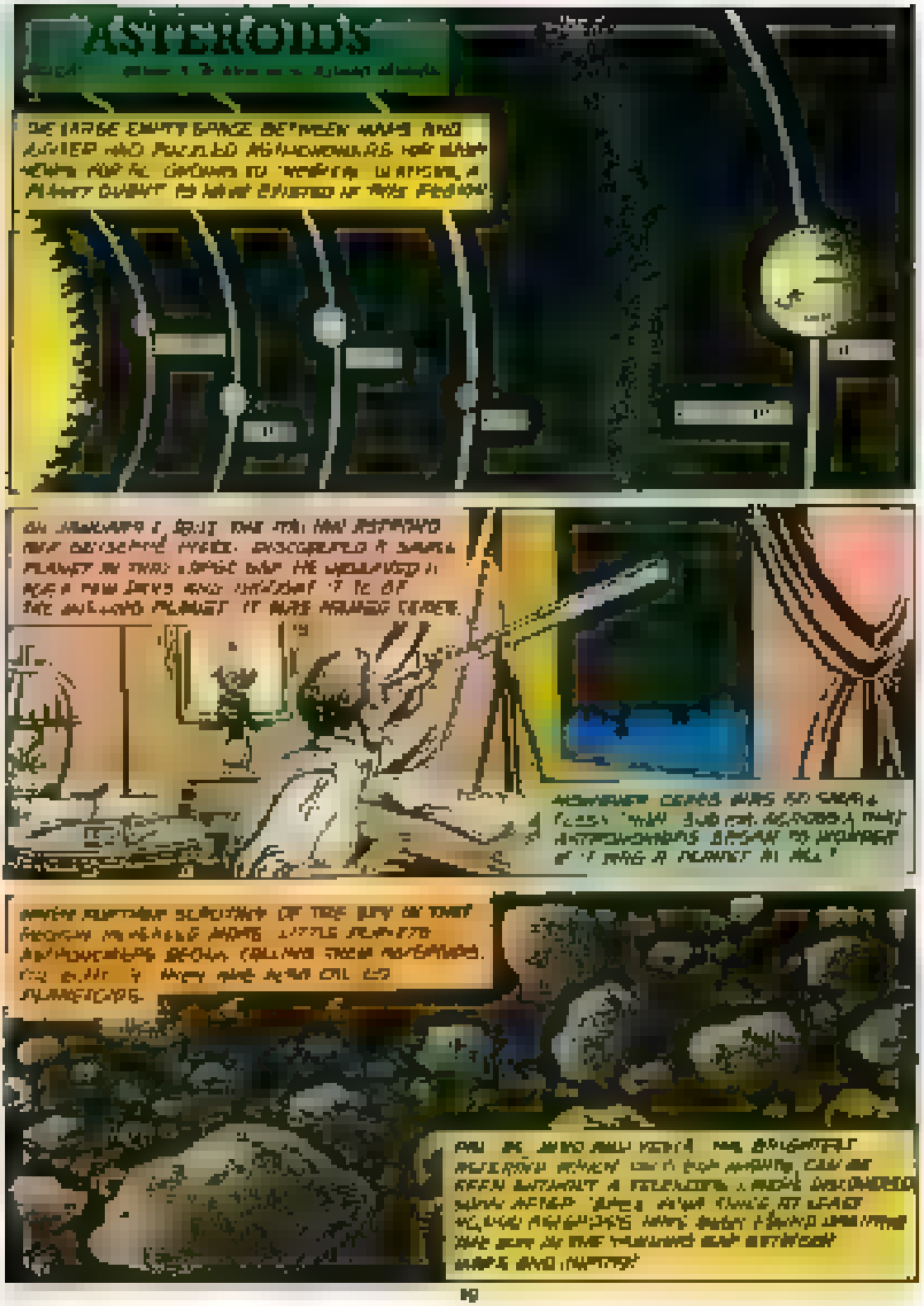
MARS

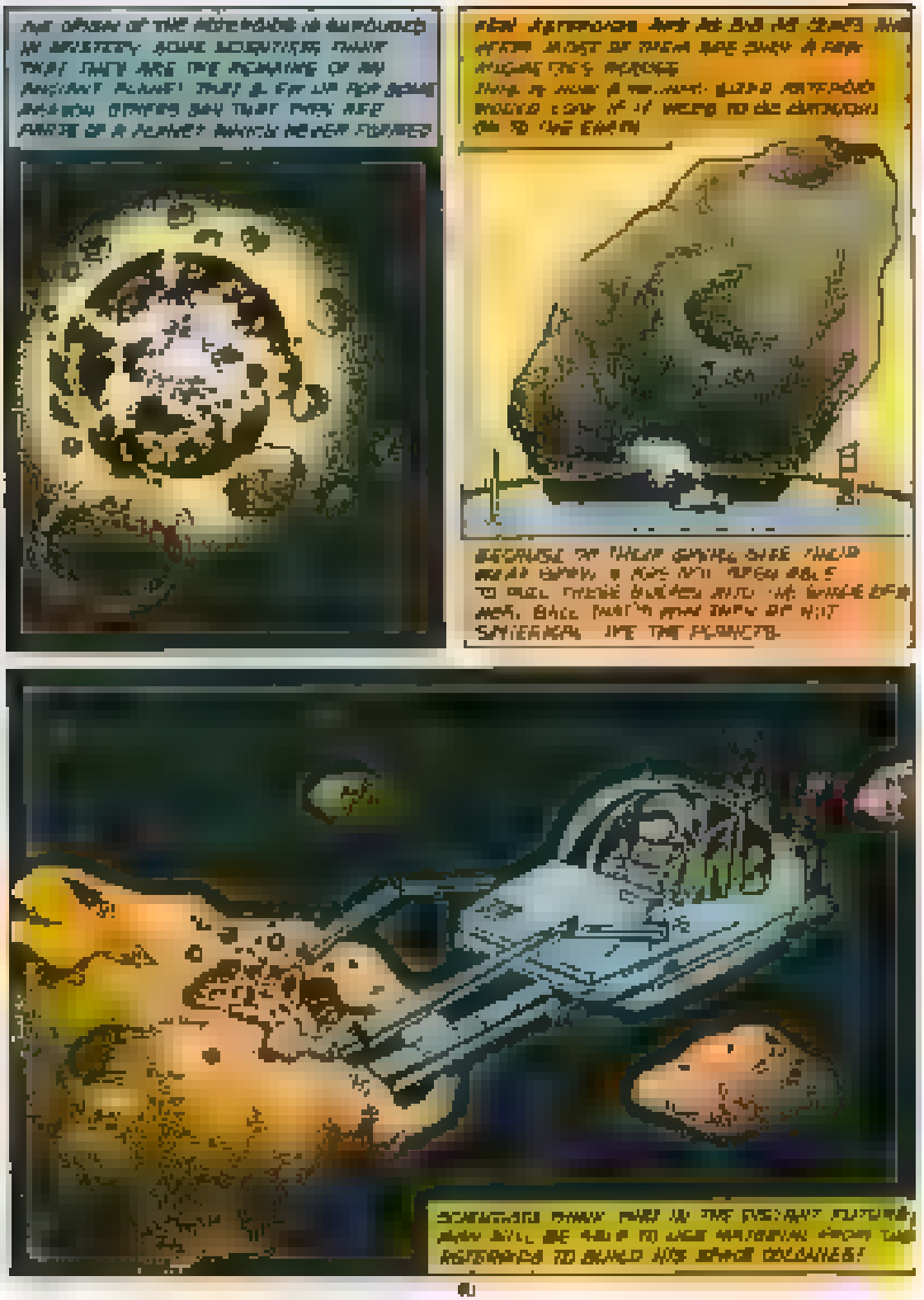
Script: J.D. [illegible]
Illustrations: Anand Mundle

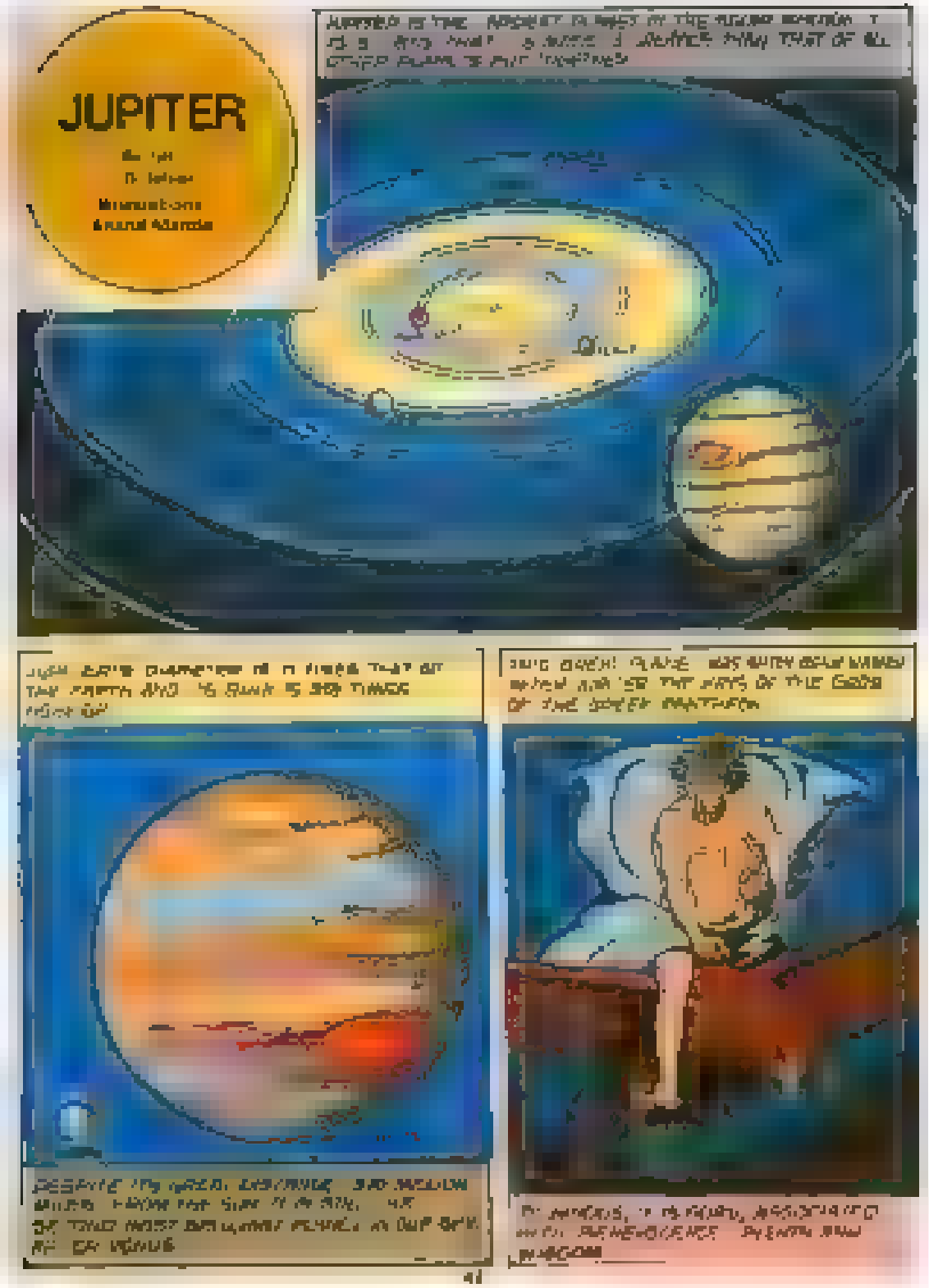


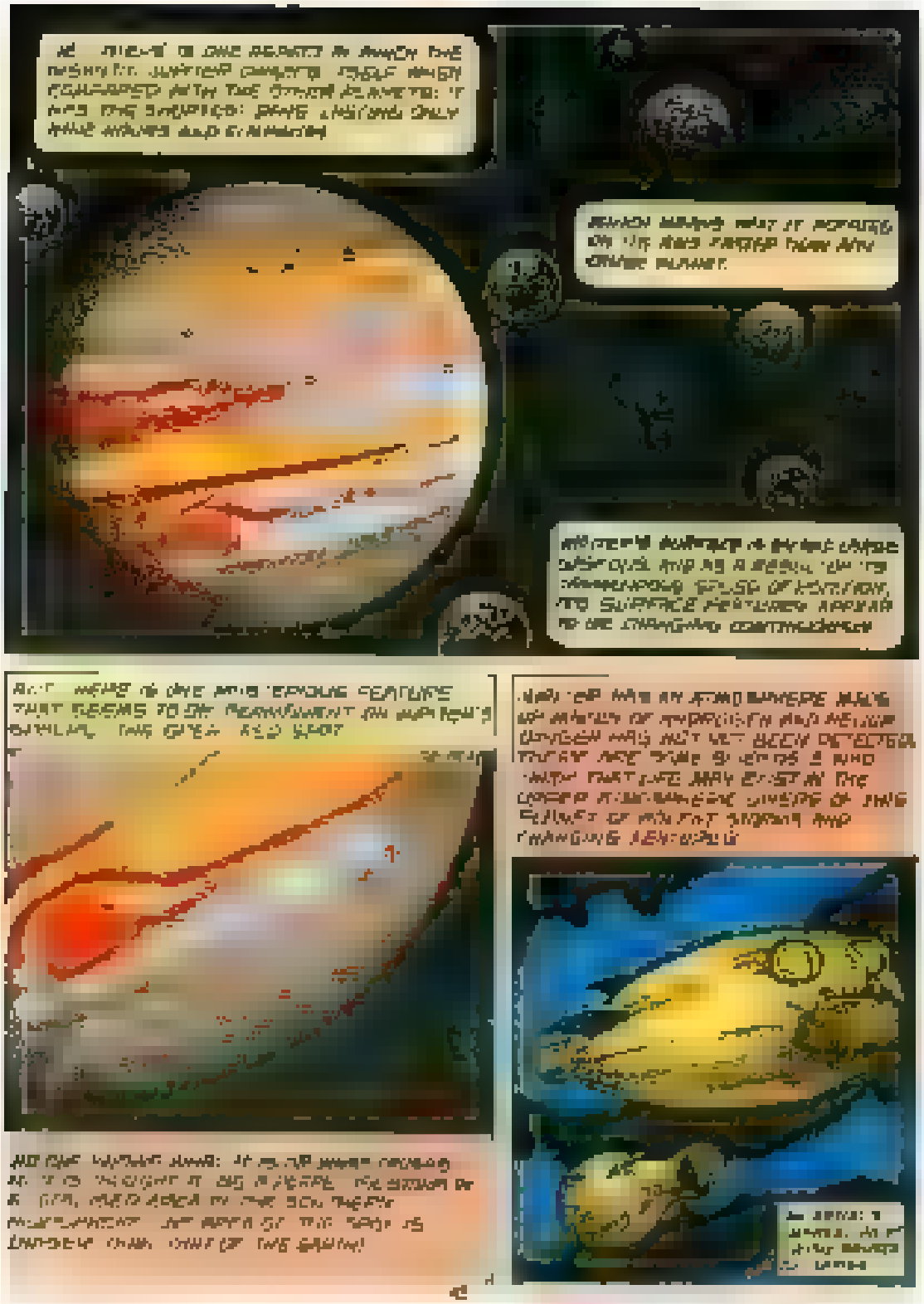


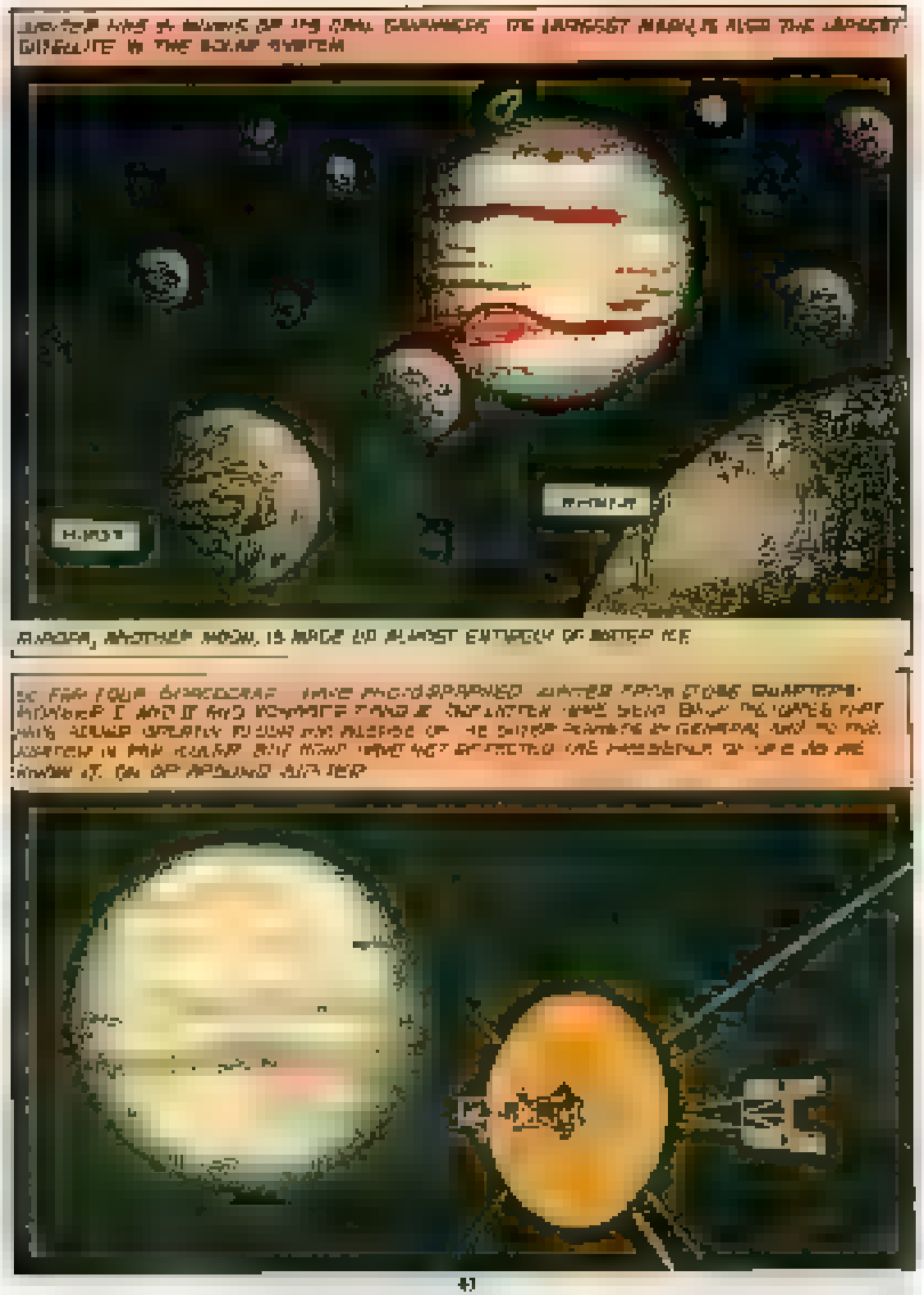



ASTEROIDS
THE LARGE EMPTY SPACE BETWEEN MARS AND JUPITER HAS PUZZLED ASTRONOMERS FOR MANY YEARS. FOR AL. DIFFERS TO 'MISSING' WARNING, A PLANET OUGHT TO HAVE EXISTED IN THIS REGION.
ON JANUARY 1, 1801 THE ITALIAN ASTRONOMER DISCOVERED A SMALL PLANET IN THIS LONGE GAP. HE NAMED IT CERES AFTER THE ROMAN GODDESS OF THE ROMAN PLANET. IT WAS ROUNDED CERES.
HOWEVER CERES WAS SO SMALL THAT ASTRONOMERS BEGAN TO WONDER IF IT WAS A PLANET AT ALL!
MORE FURTHER SEARCHES OF THE SKY IN THAT REGION REVEALED MORE LITTLE SEMI-STAR ASTRONOMERS BEGAN CALLING THEM ASTEROIDS. THE ONES THEY WERE ALSO CALLED PLANETOIDS.
THE ASTEROID BELT WAS BRIGHTEST REGION WHICH CAN'T BE SEEN WITHOUT A TELESCOPE. MORE DISCOVERED MANY AFTER. SOME HAVE TIMES AT LEAST HUNDRED KILOMETRES WIDE. MANY FOUND IN THE SAME SPACE IN THE TRIANGLE GAP BETWEEN MARS AND JUPITER.


THE ORIGIN OF THE ASTEROIDS IS SURROUNDED BY MYSTERY. SOME SCIENTISTS THINK THAT THEY ARE THE REMAINS OF AN ANCIENT PLANET THAT BLEW UP FOR SOME UNKNOWN REASON. OTHERS SAY THAT THEY ARE PARTS OF A PLANET WHICH NEVER FORMED
THE ASTEROIDS ARE AS BIG AS YEARS AND MOST OF THEM ARE ONLY A FEW MILES THICK.
THIS IS HOW A TRADITIONAL SPACE ASTEROID WOULD LOOK IF IT WERE TO DO SOMETHING ON TO THE EARTH
BECAUSE OF THEIR GENERAL SIZE THEY WOULD BREAK DOWN A FOOT NOT ABLE TO PULL THESE BURNING INTO THE WHOLE OF THE MOON. BALL THAT'S WHAT THEY DO NOT SATISFIED. LIKE THE PLANETS.
SCIENTISTS THINK THAT IN THE DISTANT FUTURE MAN WILL BE ABLE TO USE MATERIAL FROM THE ASTEROIDS TO BUILD HIS SPACE COLONIES!

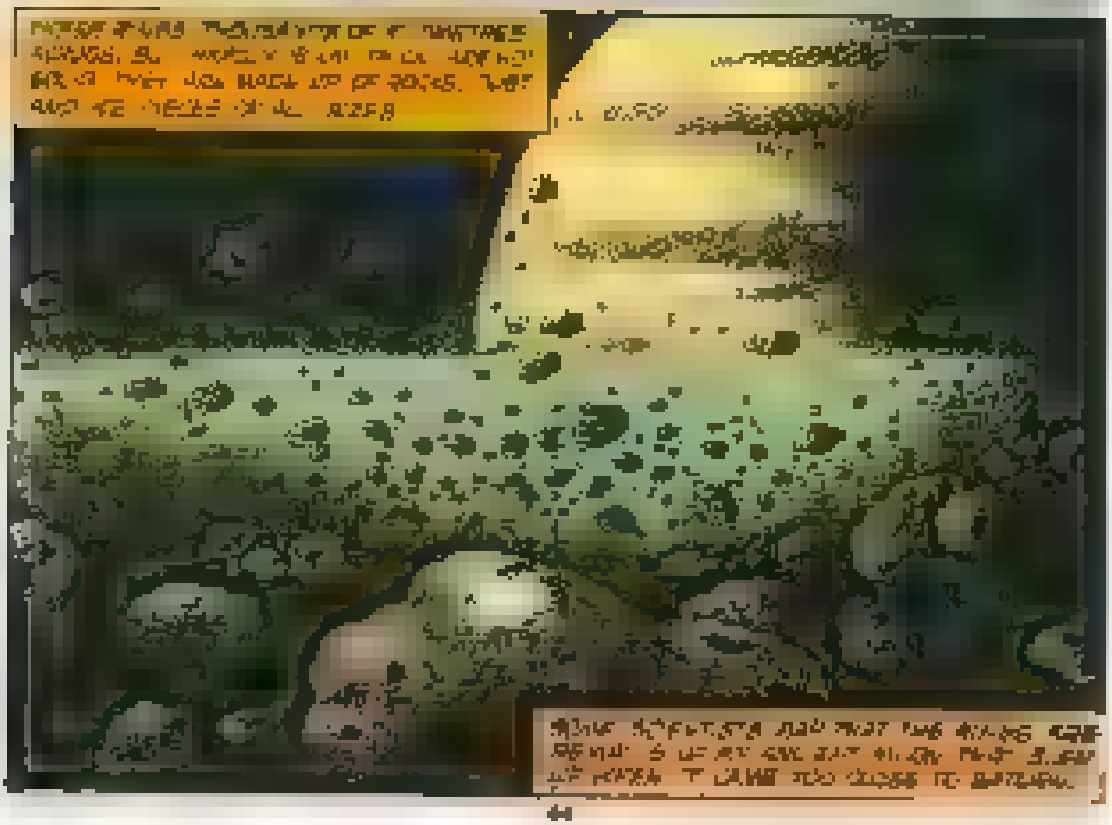

JUPITER
Illustrations
& Hand Adamson

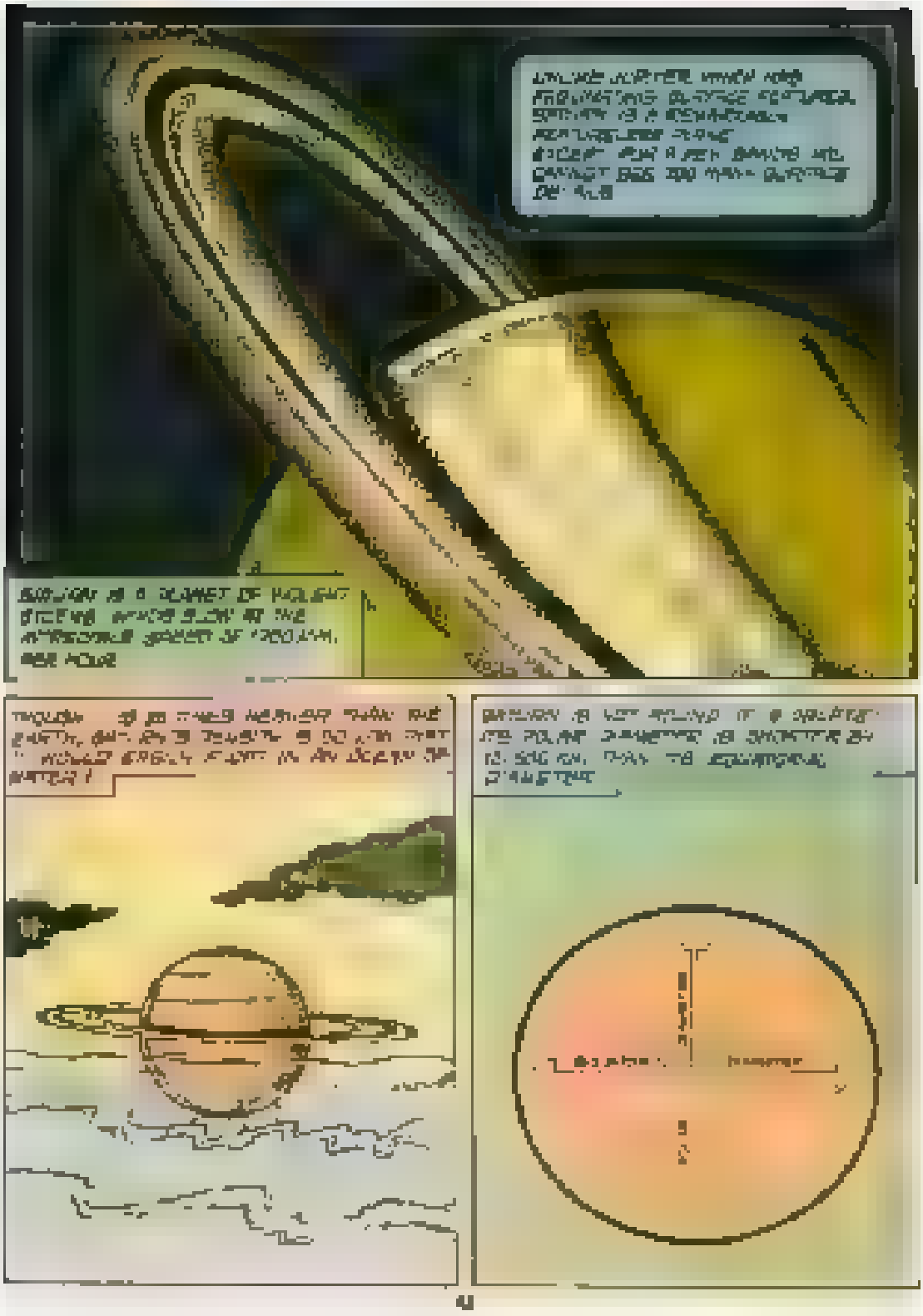

AT THIS TIME, IT ONE REMAINS IN ORBIT THE MISSION TO JUPITER CONTINUES. FOLLOW WHEN EQUIPPED WITH THE OTHER PLANETS: IT WAS THE SURFACE: BANG LIGHTNING ONLY BLUE WAVES AND EXPLOSIONS!
SEARCH MEANS WHAT IT REPORTED ON THE ARE FARTHER THAN ANY OTHER PLANET.
THE SURFACE IS BARELY LARGE ENOUGH AND AS A RESULT OF THE CHANGING STATE OF ROTATION, ITS SURFACE FEATURES APPEAR TO BE CHANGING CONTINUOUSLY
BUT THERE IS ONE MAJOR EPOCHAL FEATURE THAT SEEMS TO BE PERMANENT ON JUPITER'S SURFACE, THE GREAT RED SPOT
AND ONE MAJOR QUESTION: IT IS NOT MORE PROBABLE THAT IT IS THOUGHT IT IS A VORTEX, THE STORM IN A LOW, MUD AREA IN THE SEA, THERE PRODUCTIVENESS. THE REPORT OF THE TEAM IS ENTIRELY OVER, THAT OF THE GALAXY!
NOW THE MAN AN ATMOSPHERE MADE UP MAINLY OF HYDROGEN AND HELIUM. OXYGEN HAS NOT YET BEEN DETECTED. THERE ARE TRACE SIGNS & AND WITH THAT LIFE MAY EXIST IN THE UPPER ATMOSPHERE DUE TO THE FLOWS OF MOLTEN MAGMA AND CHANGING LEVELS!
AS SPACE: A WORLD, AS IT AFTER BEING BORN IN GRIPS

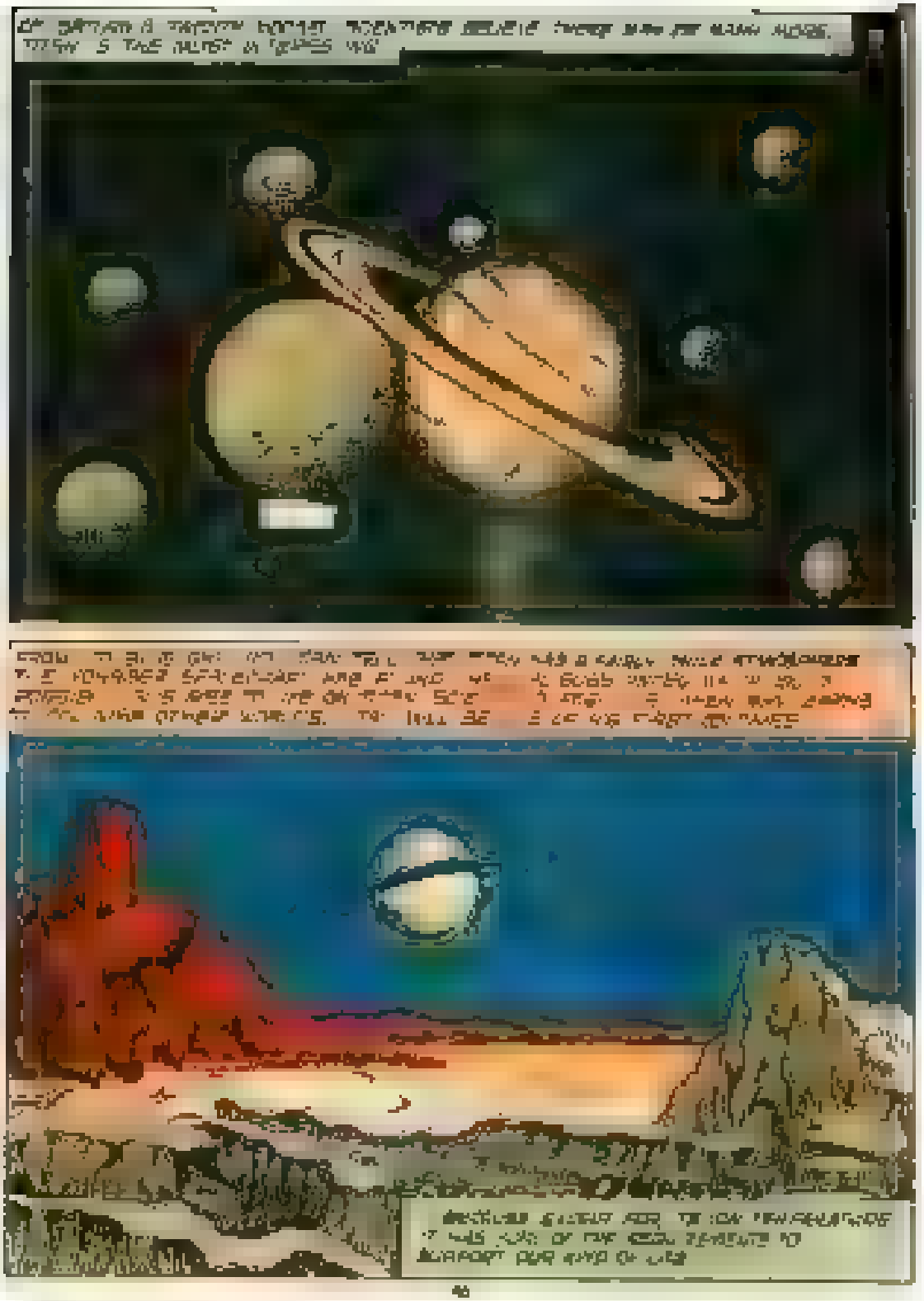

HYPERION
RHEA

SATURN

Script: J.D. Ilnor
Illustrations: Raoul Bando

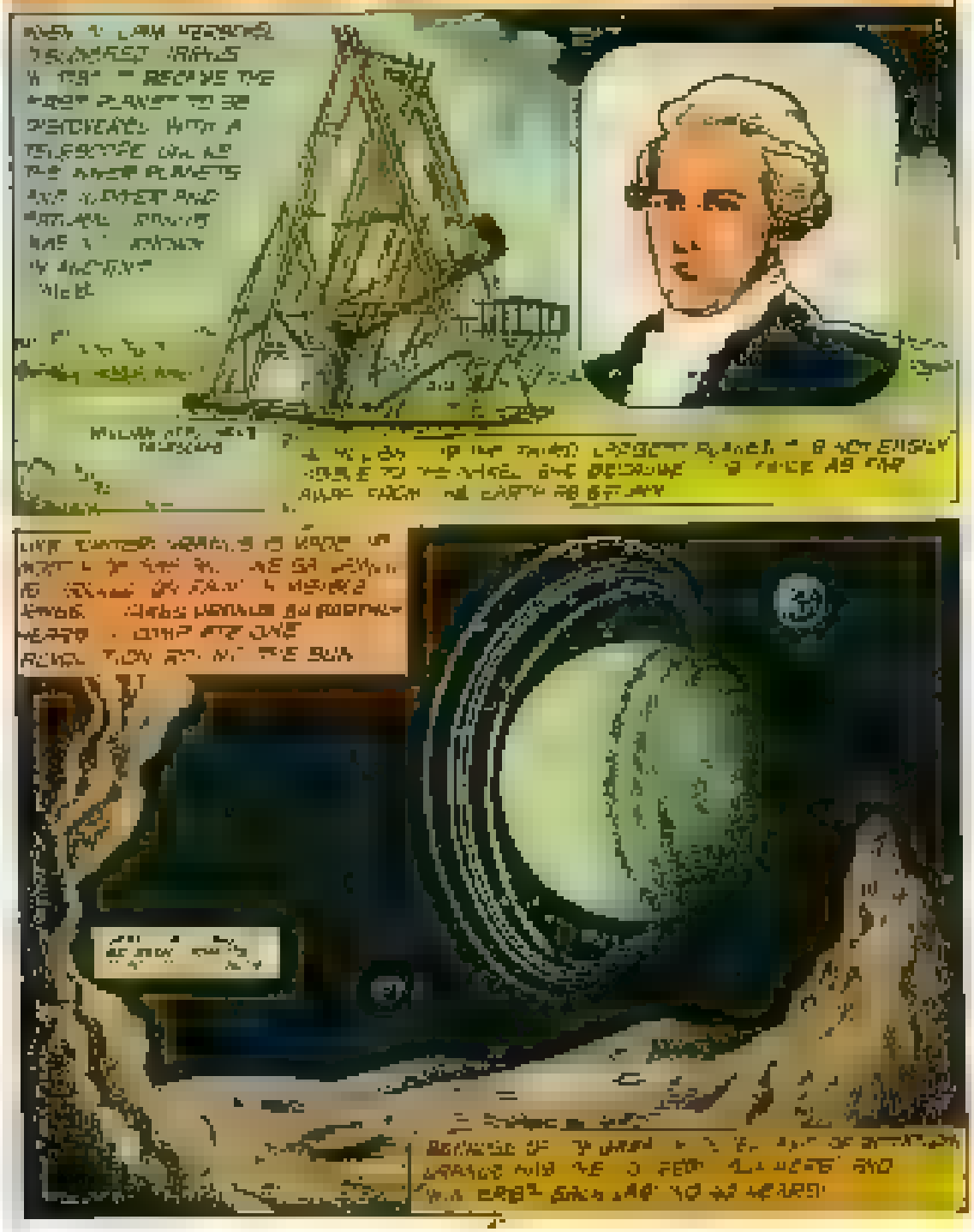


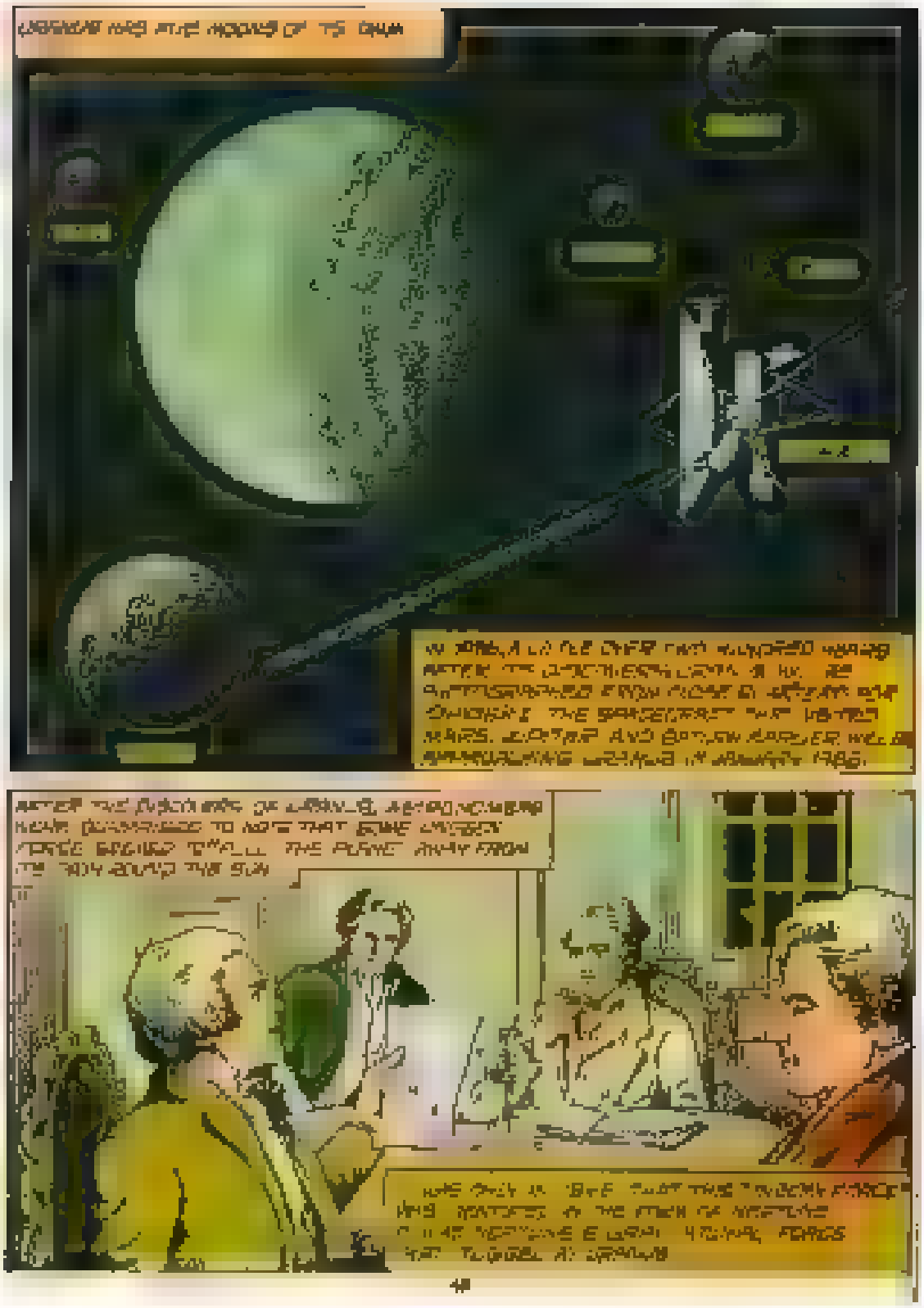

UNLIKE JUPITER, WHICH HAS PROMINENT BELTS AND ZONES, SATURN IS A RELATIVELY MONOTONOUS PLANET. THE ABSENCE OF DARK BANDS HAS ONE MAIN EXPLANATION: THE CLOUDS
SATURN IS A PLANET OF VIOLENT STORMS. WHITE SPOTS ARE THE INTERCONNECTED SYSTEMS OF THUNDERCLOUDS, ABOVE AND BELOW
THOUGH ... IF WE TAKE A MEASURE THAN THE EARTH, WHICH IS THE TRUTH, IS TO SAY THAT ... NOBODY EVER SAW IT ON ANY OCEAN OF EARTH!
SATURN IS NOT PERFECT IN ITS SPHERICITY. THE POLAR DIAMETER IS SHORTER BY 10.206 KM. THAN THE EQUATORIAL DIAMETER
DIAMETER

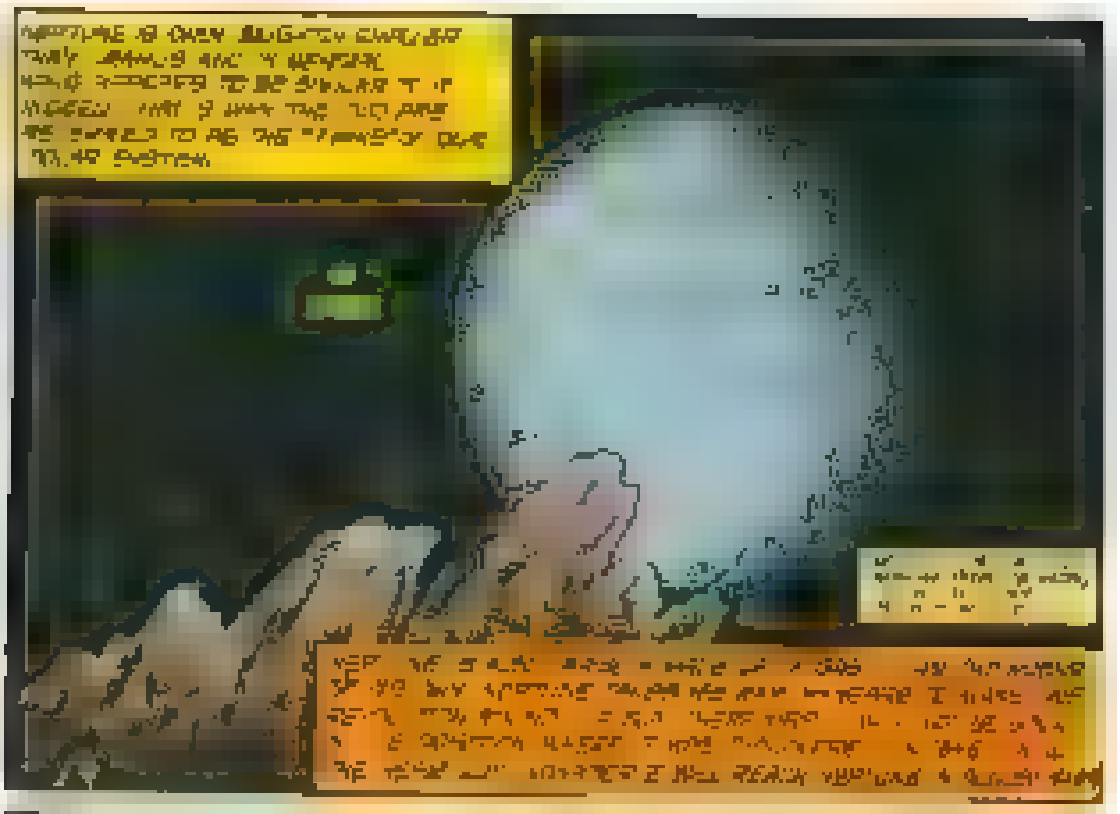


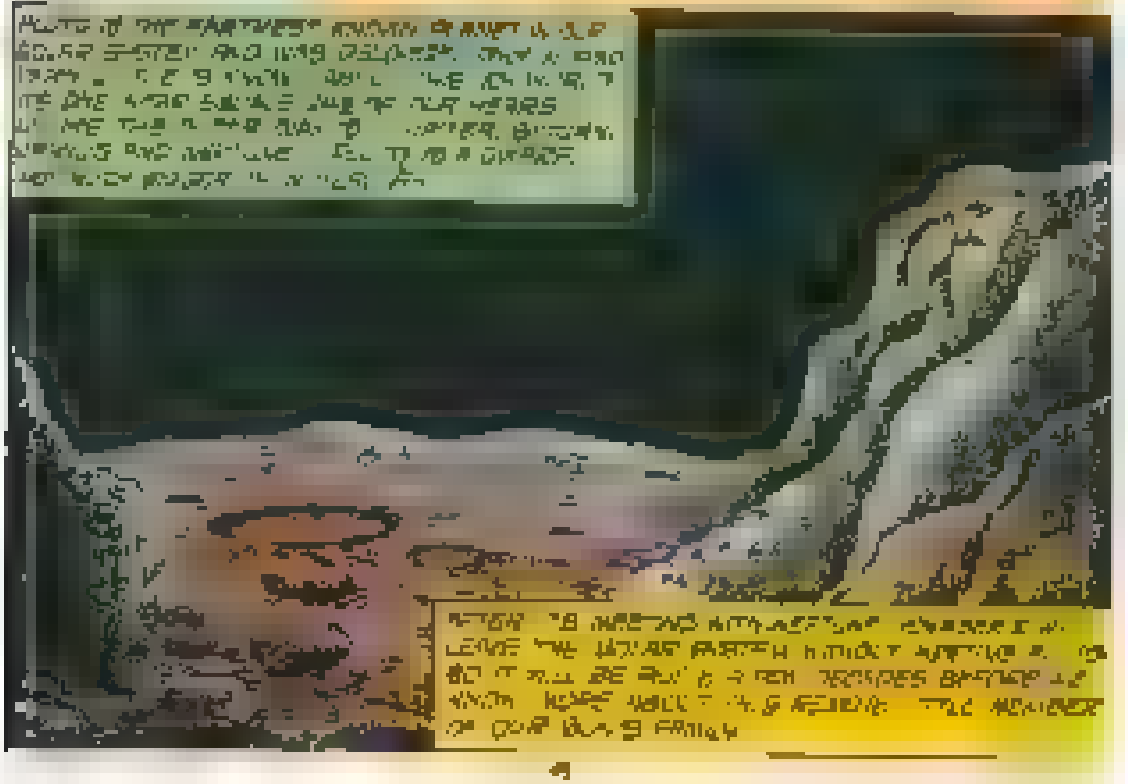
URANUS, NEPTUNE AND PLUTO

Bodge ... Jr. Editor & Don MacPherrd Illustrations: Arnold Marsh



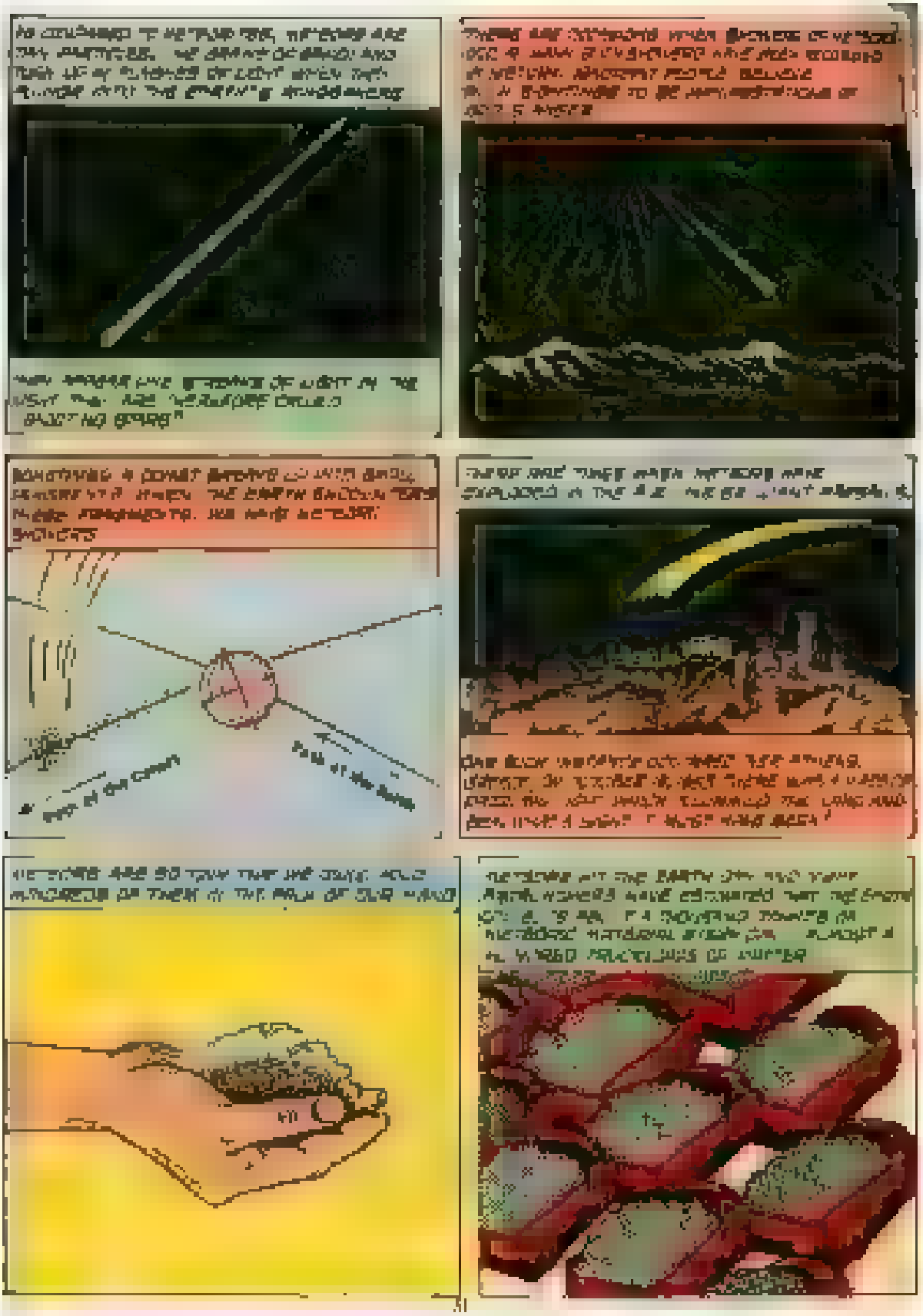

AFTER THE DISCOVERY OF URANUS, ASTRONOMERS NEAR BUDAPEST TO NOTE THAT SOME UNSEEN FORCE BROUGHT TO FALL THE PLANET AWAY FROM ITS ORBIT AROUND THE SUN





Meteors and Meteorites

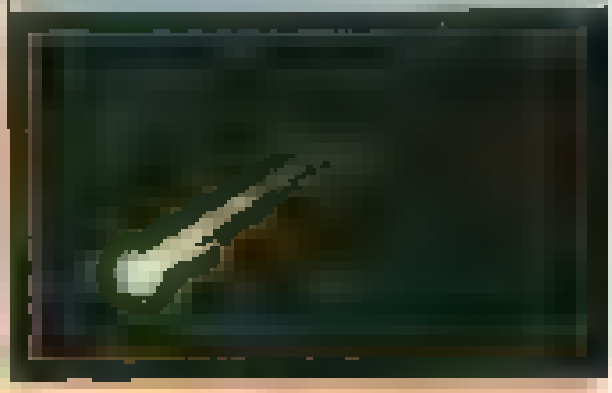
Script: J.D. Isbner
Illustrations: [illegible]

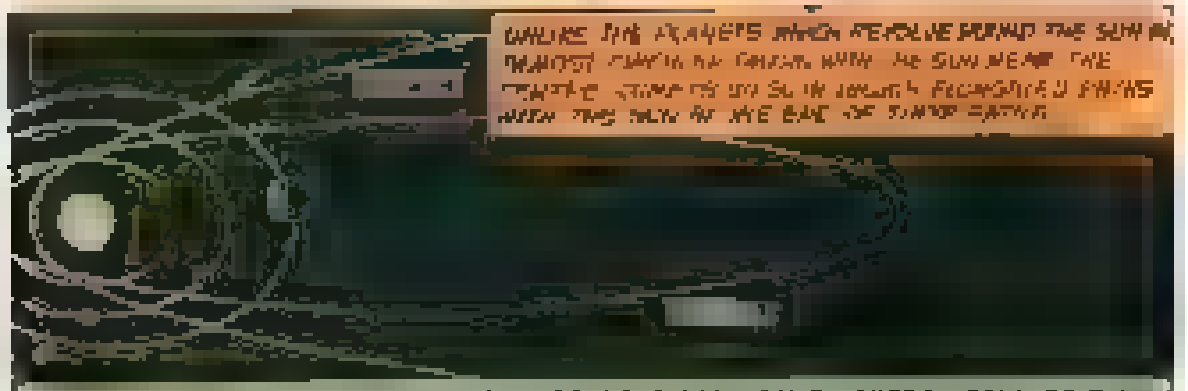


Comets

What Is Inline
Astronomer, Around Mandie

A medieval engraving of the Comet of 1618

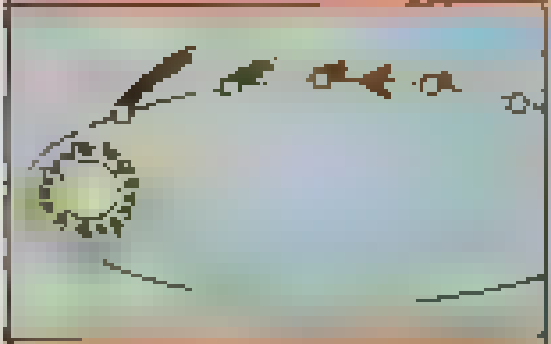




[illegible] A COMET APPEARS TO HAVE A NUCLEUS AND A HAZY [illegible] THE NUCLEUS IS MADE OF ROCKS AND ICE SURROUNDED BY A CLOUD OF GASEOUS MATTER [illegible] "COMA" [illegible] THE CONCEPTS OF GAS AND DUST

A TYPICAL [illegible] OF THE [illegible] A [illegible] VOLUME OF SPACE. SOMETIMES EVEN LARGER THAN THAT OUTLINED BY THE [illegible] THE VERY [illegible] OF IT COMETS HAVE [illegible] BEEN CALLED "DIRTY BIG BALLS" [illegible]

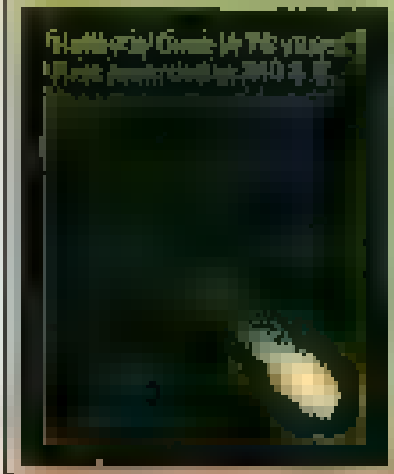
WHEN THEY ARE FAR AWAY FROM THE SUN, COMETS HAVE NO TAILS.

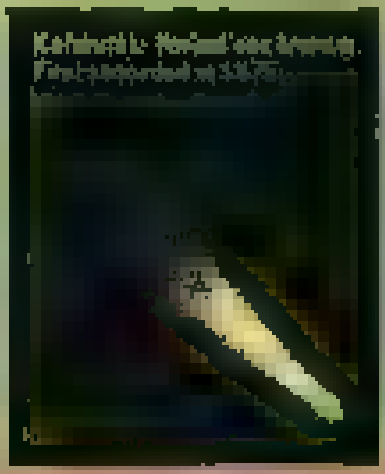


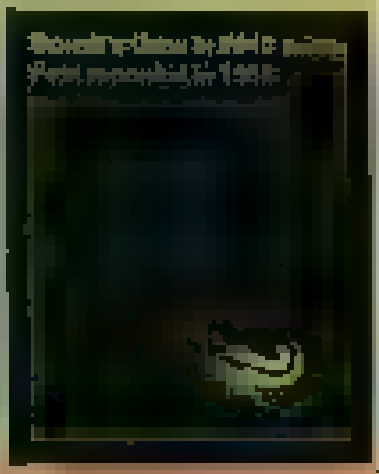
AS THEY GO THEY COME CLOSER TO THE SUN THAT THEY BEGIN TO GROW TAILS.

COMETS ALWAYS HAVE THEIR TAILS AWAY FROM THE SUN.

Here are some well-known Comets, the intervals at which they come to greet the sun and the years in which they were last recorded:







Encke's Comet, first recorded in 1786, returns every 3.3 years and Biela's Comet, which was recorded for the first time in [illegible] will return only 10,000 years later, at 11,987 A.D.

Comet HALLEY

Script: J.R. Isbor

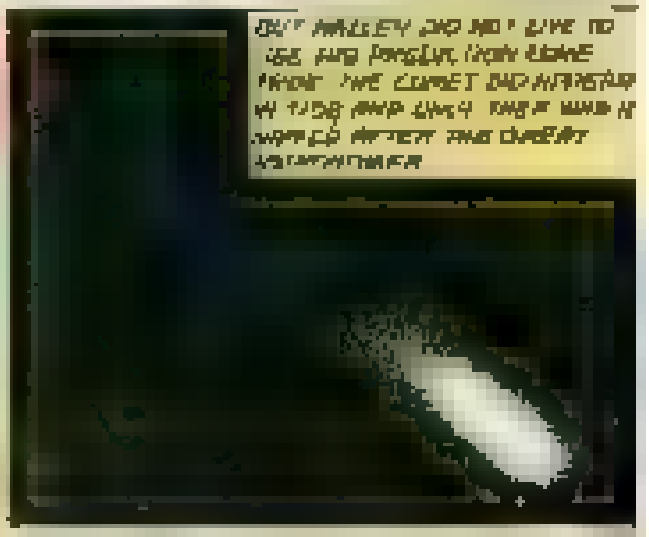
Illustrations: Jessica Blando

THE FIRST RECORD OF HALLEY'S COMET DATES BACK TO 240 B.C. BUT UNTIL 1758 NO ONE KNEW IT WAS THE SAME COMET THAT KEPT COMING BACK EVERY 76 YEARS.

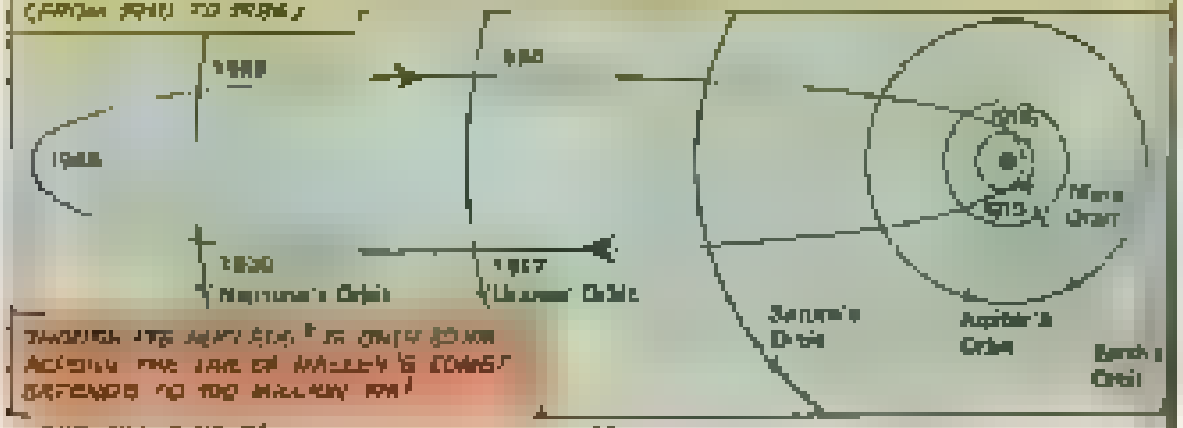
Different Representations of Halley's comet down the ages. From the 5th century (above) and A.D. 684 (right)

IT WAS THE BRITISH ASTRONOMER EDMUND HALLEY WHO CALCULATED THE PATH OF THE COMET WHEN IT WAS SEEN IN 1682 AND 1682. SO THAT IT WOULD RETURN IN 1758. AFTER 76 YEARS.

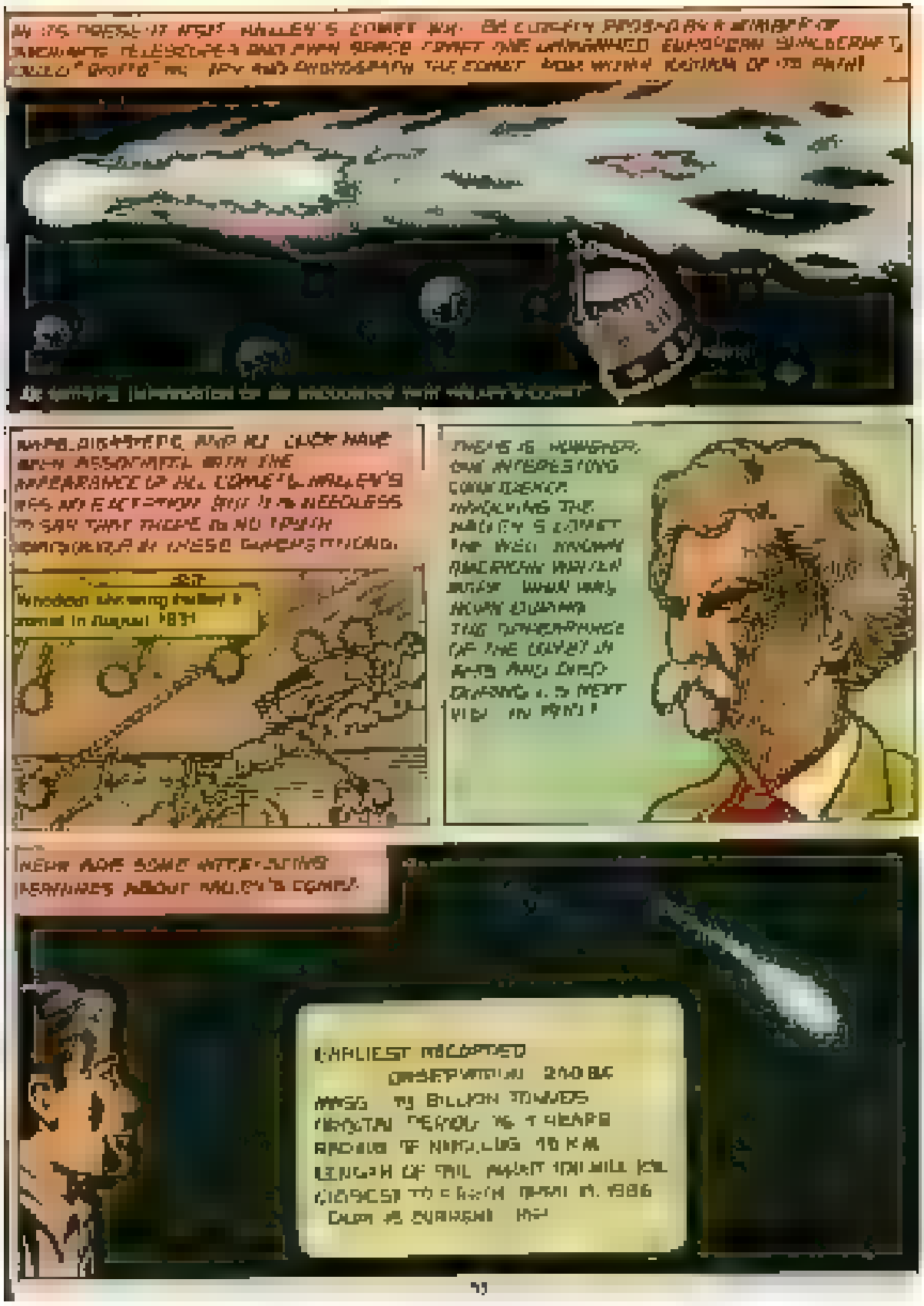
BUT HALLEY DID NOT LIVE TO SEE HIS FORECAST COME TRUE. THE COMET DID APPEAR IN 1758 AND EVEN THEN WAS IT WORLD AFFECT THE GREAT ASTRONOMER.



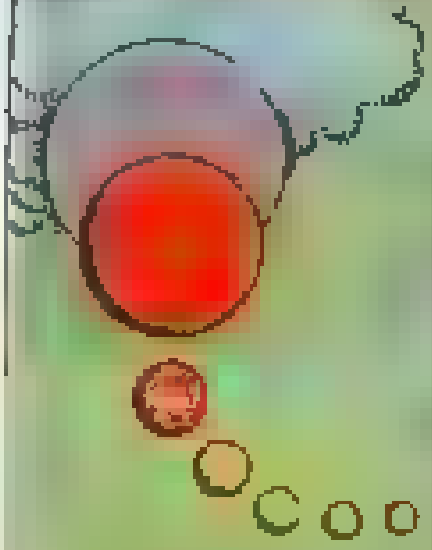
IN 1986, THE WORLD WILL ONCE AGAIN WITNESS THIS SPECTACULAR VISITOR OF THE NIGHT. AS IT RACES WITH ITS ENDLESS JOURNEY BETWEEN THE SUN AND THE FURTHEST REACHES OF OUR SOLAR SYSTEM. SHOWN HERE IS THE MONTHLY TRAVEL OF THE COMET (FROM 1910 TO 1986).

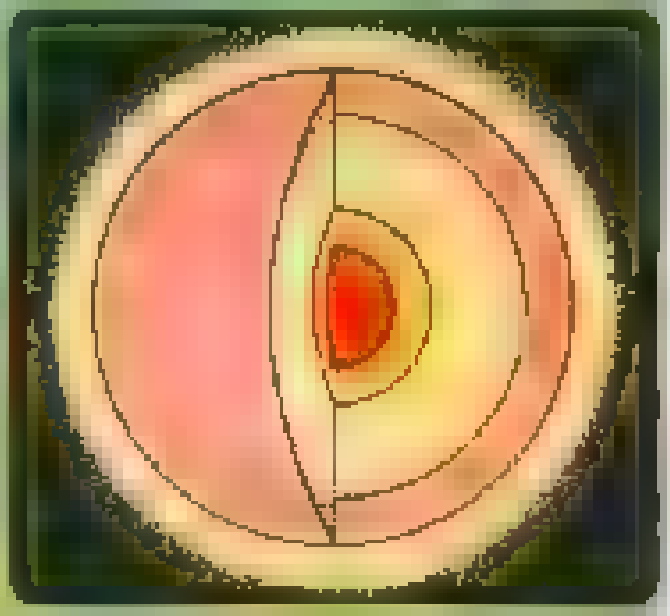


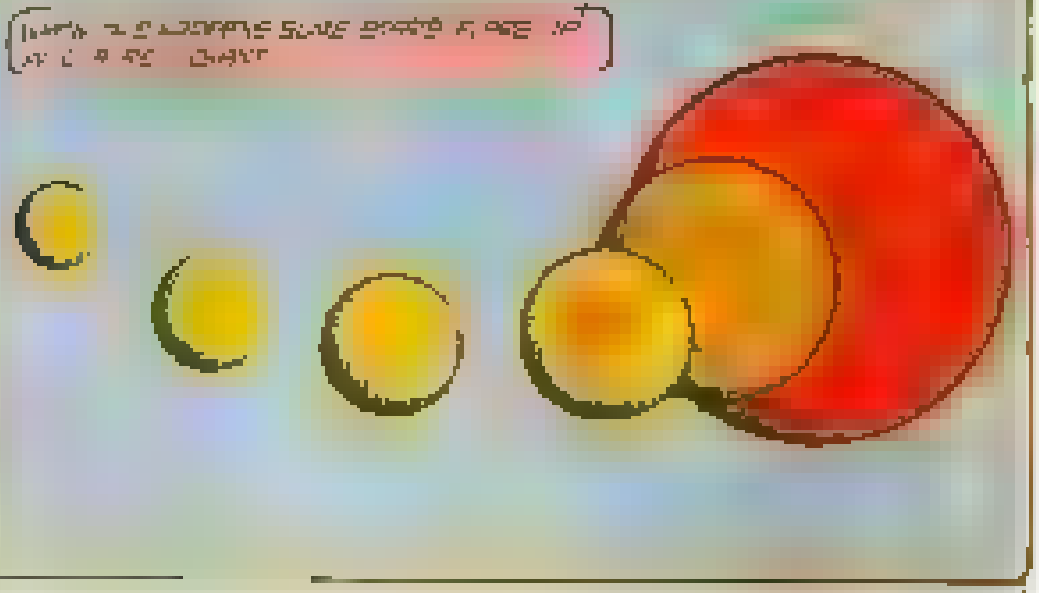
THOUGH THE NEW ERA IS ONLY SOME ACCIDENT THAT THE LIFE OF HALLEY'S COMET DEPENDS ON THE HALLEY ERA!

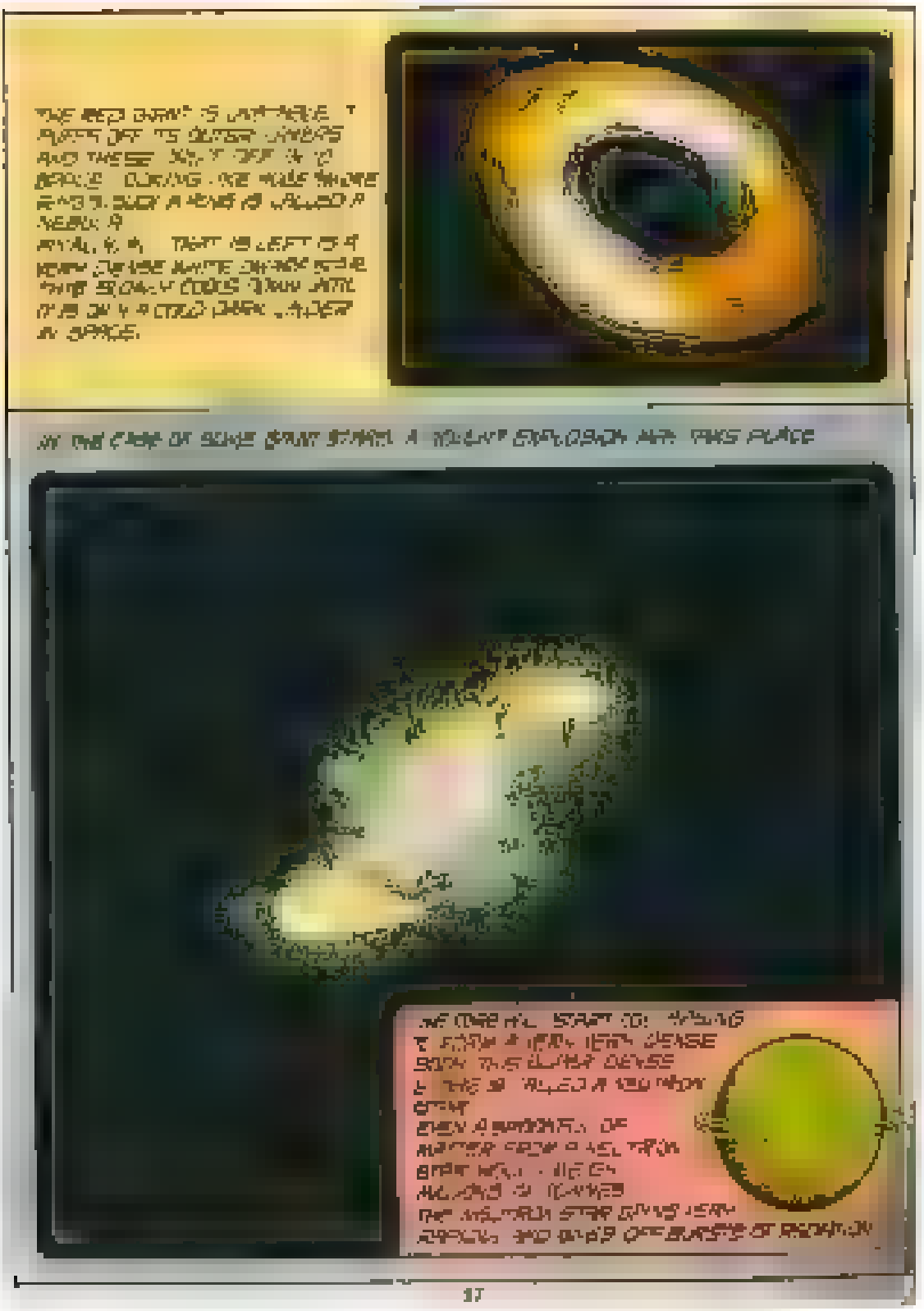

IN 1985 PRESENT WITH HALLEY'S COMET NOW BEING PROBED BY A NUMBER OF SPACECRAFT, TELESCOPES AND EVEN SPACE COMET ONE UNMANNED EUROPEAN SPACECRAFT, CALLED "GIOTTO" WILL FLY AND PHOTOGRAPH THE COMET FROM WITHIN KILOMETRES OF ITS PATH!
An artist's interpretation of the encounter with Halley's Comet
MYTHOLOGY AND ALL LOOK HAVE BEEN ASSOCIATED WITH THE APPEARANCE OF ALL COMETS. HALLEY'S WAS NO EXCEPTION BUT IT IS NEEDLESS TO SAY THAT THERE IS NO TRUTH WHATSOEVER IN THESE SUPERSTITIONS.
Wrecked Uxbridge Hallet's comet in August 1831
THERE IS HOWEVER ONE INTERESTING COINCIDENCE INVOLVING THE WORLD'S COMET THE WELL KNOWN AMERICAN WRITER MARK TWAIN WAS BORN DURING THE APPEARANCE OF THE COMET IN 1835 AND DIED DURING ITS NEXT VISIT IN 1910!
THERE ARE SOME INTERESTING FEATURES ABOUT HALLEY'S COMET.
EARLIEST RECORDED OBSERVATION 240 BC
MASS 75 BILLION TONNES
ORIGIN DEPOSITED 16.4 YEARS
RADIUS OF NUCLEUS 10 KM
LENGTH OF TAIL AVERAGE 100 MILLION KM
CLOSEST TO EARTH APRIL 19, 1986
DATE AS SUNRISE 1987

BLACK HOLES

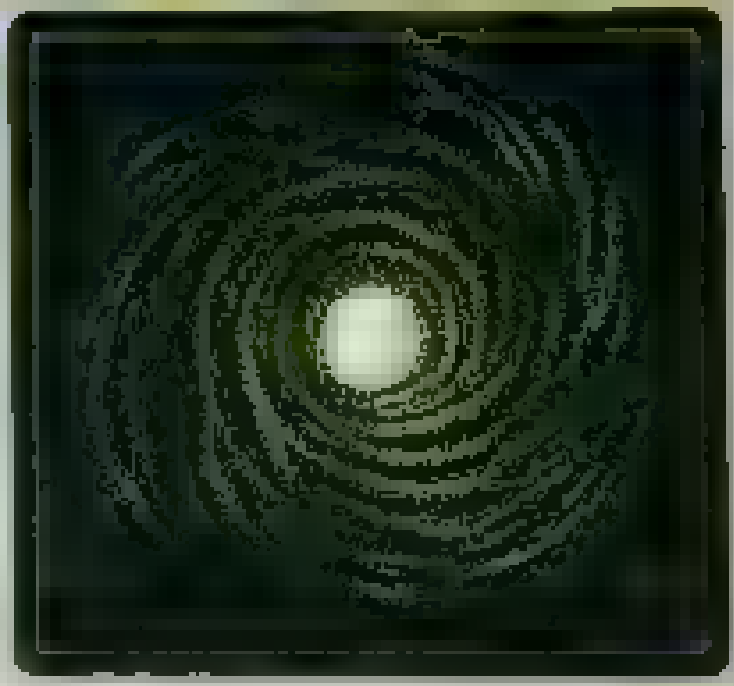







THE RED GIANT IS UNSTABLE. IT PUFFS OFF ITS OUTER LAYERS AND THESE MAY TRAVEL OFF INTO SPACE. LEAVING THE WHITE DWARF BEHIND. SUCH A NEBULA IS CALLED A PLANETARY NEBULA.
THAT IS LEFT OF A HEAVY DENSE WHITE DWARF STAR THAT SLOWLY COOLS DOWN UNTIL IT IS ONLY A COLD DARK LAYER IN SPACE.
IN THE CASE OF SOME GIANT STARS, A VIOLENT EXPLOSION ARE THAS PLACE
WE CAN SEE HOW START TO FORMING TO FORM A VERY VERY DENSE BODY THIS CLOSER DENSE IS THE SO CALLED A NEUTRON STAR
EVEN A SPOONFUL OF MATTER FROM A NEUTRON STAR WOULD WEIGH MILLIONS OF TONNES
THE NEUTRON STAR GIVING VERY ENERGETIC AND RAPID OFF BURSTS OF RADIATION

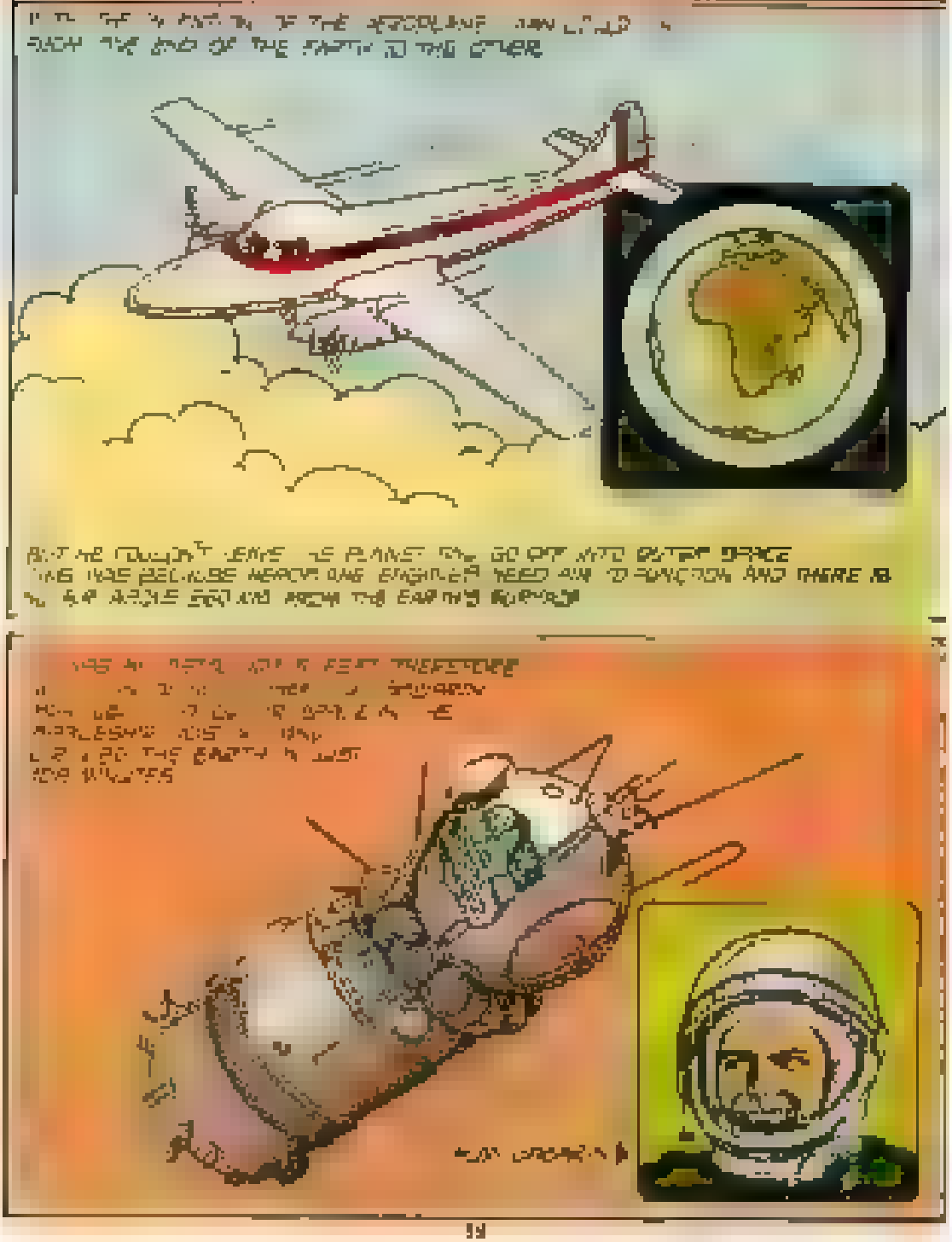
SOME STARS BURN
BRIGHT FURTHER AND END UP AS
BLACK HOLES
IN A BLACK HOLE A HUGE AMOUNT
OF MATTER IS HEAVILY COMPRESSED
INTO A VERY SMALL SPACE
THE BLACK HOLE HAS SUCH A
TREMENDOUS GRAVITATIONAL PULL
THAT IT SUCKS IN ANYTHING THAT
GOES NEAR IT .
AND ANYTHING THAT GOES
INSIDE A BLACK HOLE NEVER
COMES OUT AGAIN IT IS LOST
FOREVER
A BLACK HOLE DOESN'T EVEN LET
LIGHT COME OUT OF IT SO WE
CANNOT SEE A BLACK HOLE
IT IS TOTALLY INVISIBLE.

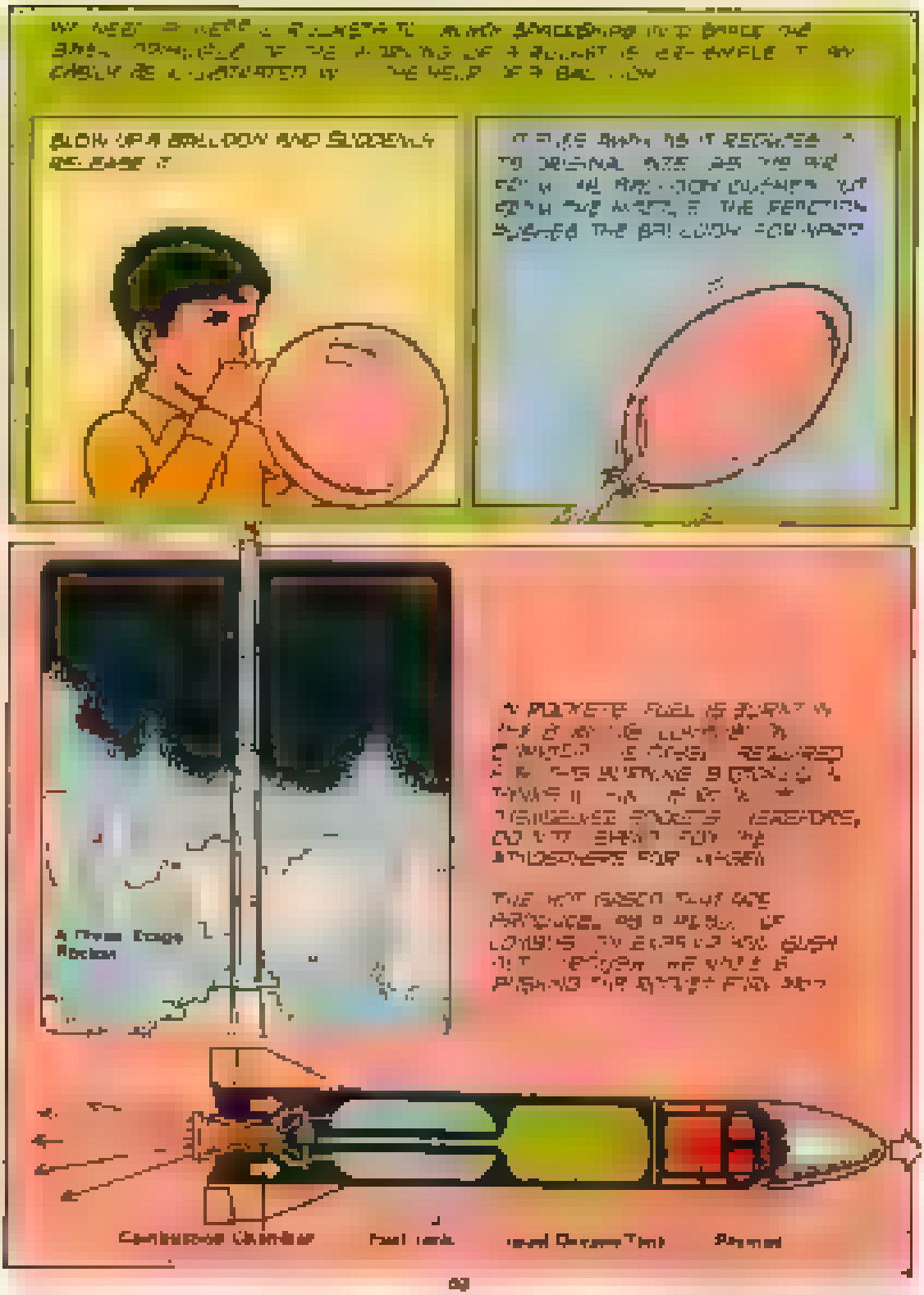


THERE SOME SCIENTISTS
BELIEVE THAT THERE MAY
BE HOLES BEYOND HOLES IN
THE SKY, OR MORE
EXACTLY, OUTSIDE THE
OUR GALAXY. IN FACT,
UNIVERSE STRETCHES
STRAIGHT AT A BLACK

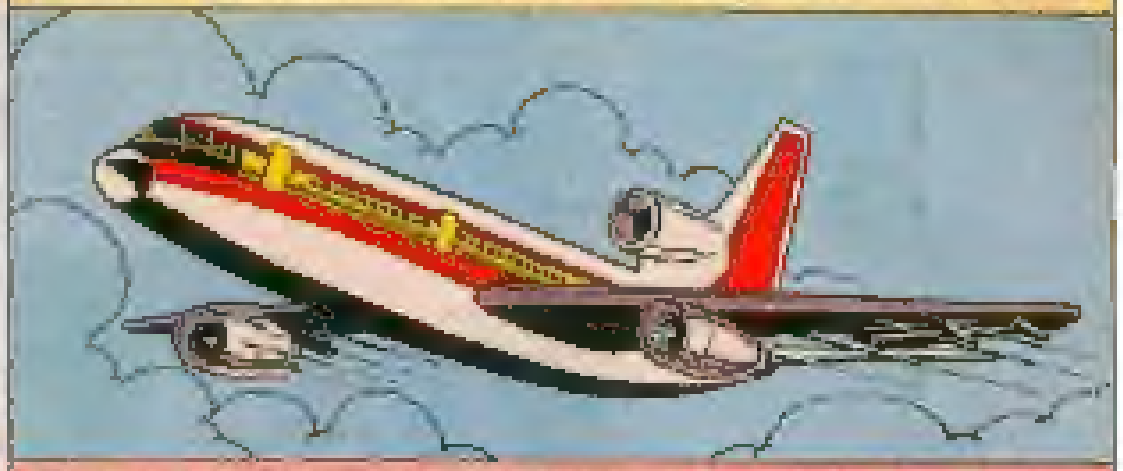
The Saga of Spaceships

Script: J.B. Salair
Illustrations: Amand Mlando

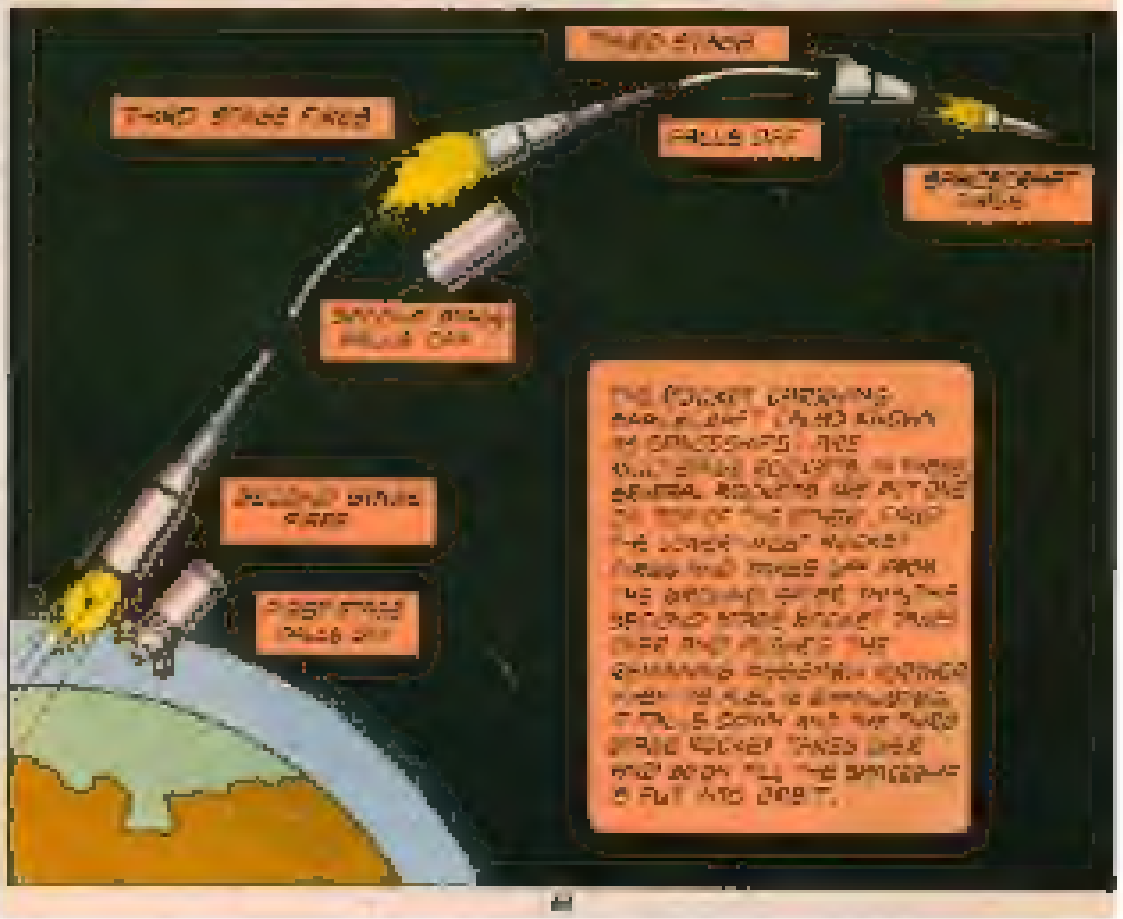



BLOW UP A BALLOON AND SUDDENLY RELEASE IT
A Cross Section
Combustion Chamber
Fuel Tank
Payload

JET AEROPLANES TOO, WORK ON THE SAME PRINCIPLE BUT THE MAIN DIFFERENCE BETWEEN A JET AEROPLANE AND A ROCKET IS THAT THE JET ENGINES TAKE OXYGEN FROM THE AIR OF THE ATMOSPHERE TO BURN THE FUEL.

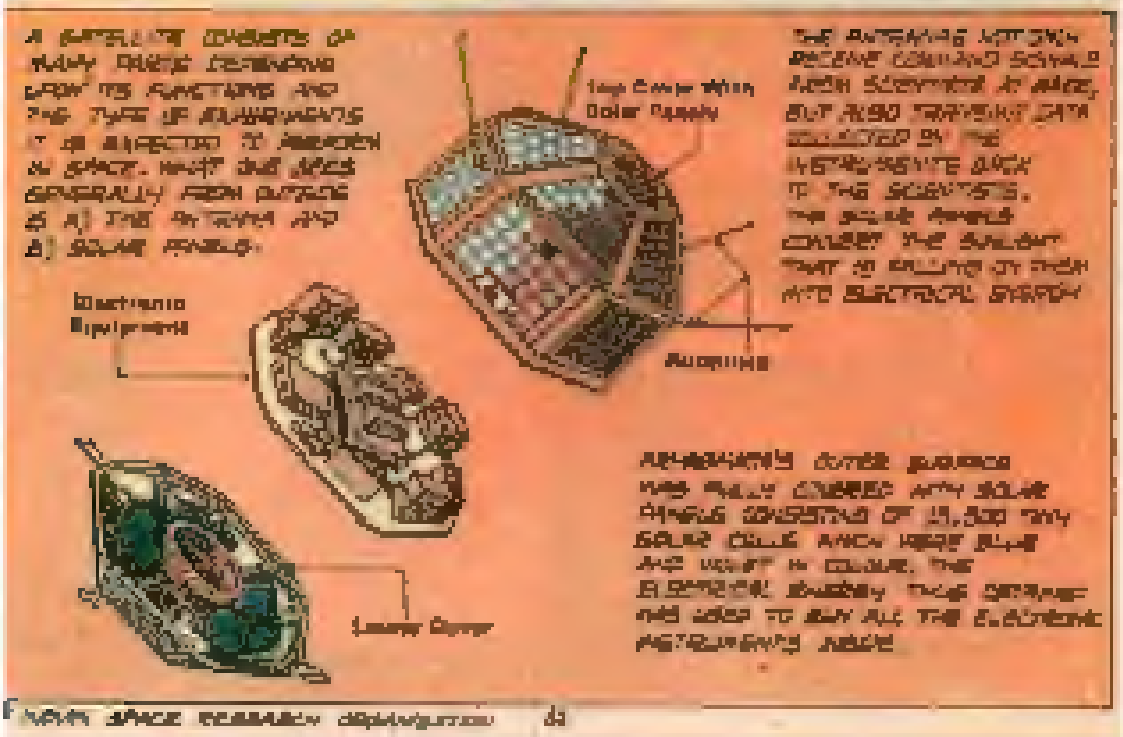


JET PLANES THEREFORE CAN WORK ONLY IN THE ATMOSPHERE WHILE ROCKETS CAN FLY IN THE TOTAL VACUUM OF OUTER SPACE.



The Saga of Indian Spaceships

Script: J.P. Ishar
Illustrations:
Anand Mande



ROHINI

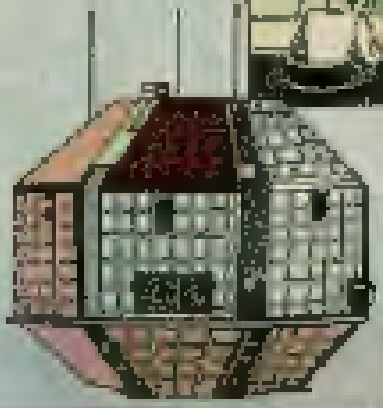
ON JULY 18, 1980, INDIAN SPACE SCIENTISTS LAUNCHED THE ROHINI SATELLITE RS-1 FROM INDIA'S SLV LAUNCH VEHICLE KNOWN AS SLV-3, SLV STANDS FOR SATELLITE LAUNCH VEHICLE.

THE SOVIET SPUTNIK WAS DESIGNED AND DEVELOPED ACHANDALAM AT KERALA'S VIKRAM SARABHAI SPACE CENTRE AT THIRUVANANTHAPURAM. THIS WAS A UNIQUE ACHIEVEMENT FOR INDIAN SCIENTISTS. THE LAUNCH VEHICLE HAD 44 MAJOR PARTS WHICH HAD IN ALL MORE THAN 125,000 COMPONENTS.

THERE ARE ONLY A HANDFUL OF COUNTRIES IN THE WORLD WHICH HAVE SATELLITE LAUNCH CAPABILITIES OF THEIR OWN. INDIA JOINED THIS EXCLUSIVE GROUP OF NATIONS WHEN IT LAUNCHED THE ROHINI SATELLITE ON BOARD SLV-3.

BHASKARA

WITH THE EXPERIENCE GAINED IN THE LAUNCHING OF ARYABHATTA, INDIAN SPACE SCIENTISTS DECIDED TO FOLLOW IT WITH SPECIAL PURPOSE SATELLITES. THE RESULT WAS THE BHASKARA I SATELLITE.



BHASKARA I AND BHASKARA II WERE LAUNCHED FROM A SOVIET COSMODROME ON JUNE 7, 1979 AND NOVEMBER 20, 1981 RESPECTIVELY. THESE WERE SPECIAL PURPOSE SATELLITES KNOWN AS "REMOTE SENSING SATELLITES". REMOTE SENSING MEANS SEEING AND RECORDING THE EARTH'S FEATURES FROM A LONG DISTANCE. THEY COLLECTED VERY USEFUL DATA REGARDING BY INSTRUMENTS (METEOROLOGICAL), AGRICULTURAL SUBJECTS AND OCEANOGRAPHY.

APPLE

THE INDIAN POSTS AND TELEGRAPHS DEPARTMENT AND ISRO WANTED TO LAUNCH A SATELLITE TO CONDUCT EXPERIMENTS IN COMMUNICATIONS, LIKE TRANSMITTING SPEECH AND TV PICTURE SIGNALS, OVER INDIA. APPLE WAS THE SATELLITE DESIGNED FOR THIS. APPLE, WHICH WEIGHED 670 KG., WAS LAUNCHED BY THE EUROPEAN SPACE AGENCY'S LAUNCH VEHICLE ARIAN 3 FROM KOUROU, IN 1981.

INSAT

INSAT-1 IS THE FIRST IN THE SERIES OF MULTI-PURPOSE SATELLITES. INSAT STANDS FOR INDIAN NATIONAL SATELLITE. THESE MULTI-PURPOSE SATELLITES HAVE MANY FUNCTIONS: LONG-DISTANCE TELEPHONE NON-USE, OBSERVATION OF THE EARTH FOR METEOROLOGICAL PURPOSES (TO FIND OUT EARLY WARNINGS IN CASE OF APPROACHING NATURAL DISASTERS) AND DIRECT T.V. BROADCASTS. INSAT-1 WAS LAUNCHED ON APRIL 10, 1982.